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ABSTRACT

This module is the fourth section of a four-part how-to manual for integrating curriculum in grades K-12, especially in Missouri. The module discusses the topic of assessment and provides suggestions for assessing students, integrated teaching, and integrated programs. Comments from teachers, students, and administrators who are actively involved in integration in Missouri schools are interspersed throughout the module. The schools from which ideas were drawn were selected to represent a broad spectrum of learning environments, from urban to rural, from magnet school to comprehensive K-12. The module is organized in three sections discussing how to conduct assessment of students, teachers, and the integrated program. A case study of the Farmington School is provided. The module also includes descriptions of 10 school reform measures, a glossary defining 19 terms, and a few references dispersed throughout. (KC)

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A PRACTITIONER'S GUIDE TO INTEGRATION

MODULE 4

Assesment

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A PRACTITIONER'S GUIDE TO INTEGRATION

Assessment

MODULE 4

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MODULE 4: PREFACE

"A Practitioner's Guide To Integration" is designed to serve as how-to manual for anyone, grades kindergarten through twelfth, who is interested in integrating curriculum. The manual is divided into four separate modules, each of which discusses a common question related to integration. These modules are: Module 1: What is Integration? and Why Integrate? Module 2: Why Integrate? Module 3: How to Integrate - Step-by-Step, and Module 4: How Do We Assess Integration Throughout the District?

Module 1, provides a definition for integrated learning and suggests ways to categorize types of integration. It also examines the benefits of integration for everyone involved and dispels many of the common myths about integration. Module 2 focuses on how integration can occur, with topics ranging from communication to scheduling to various models, career paths and thematic units. Module 3 outlines step-by-step procedures for integrated units, integrated years, and integrated schools. This module, Module 4, discusses the topic of assessment and provides suggestions for assessing students, integrated teaching, and integrated programs.

Each module is intended to stand on its own. Readers should feel free to select one or more of the modules that are particularly pertinent to them. In keeping with the independent nature of the modules, each module concludes with its own resource list of pertinent materials to refer to for additional information.

Case studies and comments from those who are actively involved in integration can be found throughout the modules. They can serve as a rich source of ideas and inspiration and can help readers learn from the experiences of others. Although each case study is located in one of the four modules, each study has much to say about many different topics, not just the topic addressed in that particular module. The schools portrayed in the case studies were selected to represent a broad spectrum of learning environments, from urban to rural, from magnet school to comprehensive kindergarten through twelfth grade.

To understand integration in an actual school setting, we chose a case-study design. Our review of literature told us that integration was an evolving practice with different schools taking different approaches. We selected our sample from schools that educators identified as attempting integration in various degrees. We also used schools that represented different segments of the educational system in Missouri, such as small schools, intercity schools and schools that are integrating through different grade levels. Throughout this document you will visit four case studies

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that outline various methods of providing integrated learning. We found these schools to vary in different degrees and also found some common threads throughout all of the schools.

We found in most cases, changes in pedagogy and curriculum were not the results of mandates, but rather a bottom-up, grass-roots effort by teachers to improve their own classes. Integrated academics were initiated by teachers or administrators who felt frustrated that their students were unprepared for the workplace and unable to make connections between subject matters.

The desire for the teacher to transmit knowledge is deeply rooted. A teacher's collegiate experience is usually dominated with instructional format that emphasizes transmission of knowledge through lecture. Modeling from generation to generation has been the practice in many classrooms.

It's not that educators have been doing a poor job of educating all along. But, our current educational system, which was developed in the early 1900s in response to the industrial revolution and patterned after the assembly line, no longer meets the needs of a technological/ information society competing in a global marketplace. The education system of the 21st century should parallel the "real world" and should implement site-based decision-making, strategy planning and total quality management processes used in industry.

Have previous educational reform methods provided a bandage or the cure to our educational system? Most educators will answer "a bandage." Integrating academics will be successful because it attempts to RESTRUCTURE the delivery of our educational system.

In restructuring, we must remember: the teachers are the foundation of every educational structure. To reinforce the foundation we must provide teachers with new methods, techniques and ideas for teaching. We must reinforce the foundation with quality materials that are useable to teachers. The teachers will polish and shine the materials and present them in a method that the students will grasp and understand.

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Glossary of Terms

1. **Academic performance standards** - consist of selected target knowledge or behaviors which students should be expected to perform prior to successfully completing an educational program.

2. **Authentic assessment** - assessment of student performance based on "real world" experiences or standards found in or associated with the world of work.

3. **Cognitive complexity** - one of the key features of authentic assessment procedures is that they be sensitive to the cognitive complexity of students. Does the assessment procedure capture my student's ability to think or have I only focused on facts. Does the tool provide some indication of their problem-solving ability as well as the processes they use to address problems?

4. **Competency** - is a learned behavior which can be repeated to predetermined standard.

5. **Competency-based education** (CBE) - is a methodology of instruction that (a) identifies the cognitive, psychomotor, and affective skills needed to meet a specific standard; (b) informs students and teachers of the precise and detailed learning objectives required to achieve performance; (c) emphasizes performance standards in testing, course requirements, and/or graduation; and (d) facilitates learning by allowing each student to master the task through flexibility in learning time and methods.

6. **Content quality** - most academic disciplines have developed, or are in the process of developing standards. In vocational areas, there has been a long history of identifying and validating competencies for the various technical service areas. Teachers should ask "Do my assessment tools accurately connect with those standards that have been established for my teaching area?"

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7. **Content standards** - spell out the subject-specific knowledge and skills that schools are expected to teach and students are expected to learn. Standards-setters have adopted the shorthand phraseology "what students should know and be able to do."

8. **Criterion-referenced evaluation** - is a procedure that measures student performance or knowledge according to the conditions and standards stated in the performance objective.

9. **Endogenous model** - is viewing education from *within the educational system.*, i.e. Curriculum divided into familiar academic disciplines (math, science, history, music, etc.); intelligence and achievement defined in terms of verbal (reading and writing) and analytical abilities.

10. **Exogenous model** - is focused on the perspective of *what is valued and needed by society,* curriculum organized around the needs of society and the development of specific competencies (integrated topics, workplace issues, societal issues, technical & social problems, etc.) ; intelligence viewed in multiple ways including problem solving, concrete and applied abilities.

11. **Integration or integrated/infused academics** - is a process of forming, blending, coordinating or weaving into a functioning or unified whole. It is the fusion of what were separate or distinct disciplines into one subject area.

12. **Interdisciplinary unit of instruction** - is materials and/or information spanning or crossing one or more disciplines necessary for instructional periods for the teaching/ learning process in order to reach the unit objective.

13. **Performance objective** - is a statement of what the student must do in observable and measurable terms.

14. **Product evaluation** - is the rating of the product of a student's performance: also a summative evaluation.

15. **Process evaluation** - is a measure of a student's ability to perform a given procedure: also a formative evaluation.

16. **Rubrics** - are scoring devices (or tools) which are designed to assist in the process of clarifying and communicating expectations. Rubrics are expectations or grading grids which contain specific information about what is expected of students for every performance standard.

17. **Task analysis** - is the identification of cognitive, psychomotor, and affective skills needed to perform a specific task.

18. **Taxonomy** - is a system of classifying objectives into types or levels. Examples: Bloom's Taxonomy, Snyder Taxonomy.

19. **Unit objective** - is a statement of the intended purpose (overall behavioral outcome) expected of each student after completion of a unit of instruction.

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School Reform Measures

1. Workforce 2000 - a study published in 1987 was the basis for President Bush's education reform in America 2000. The report recommends better skills training and improved service productivity as needed for future job expansion. The report projected a continued shift from manufacturing to service employment.

2. **A Nation At Risk** - A 1983 report by the National Commission on Excellence in Education called for major changes in public schools and criticized America's educational system for producing high school graduates with fewer academic abilities because of too many general track courses, fewer students in higher science and math, and a decreased time spent on homework. The study recommended Vocational Education should demand the same stringency.

3. **The Unfinished Agenda** - A 1984 report by the National Commission on Secondary Vocational Education promoted the integration of academic and vocational education along with emphasizing the intensity in academics for vocational students. The commission recommended bridging the gap between academic and vocational courses.

4. **SCANS** - (Secretary's Commission on Achieving Necessary Skills) Developed by the Department of Labor that concluded: that basic skill competencies "should be taught and understood in an integrated fashion that reflects the workplace contexts in which they are applied."

The commission spent two years studying what people need to know to hold productive and high-paying jobs. The Commission emphasized not a change on what is taught - only how it is taught.

5. **America 2000** - President Bush's national education goals:

   a. All children start school ready to learn

   b. A 90% high school graduation rate

   c. Competency in English, math, science, history and geography

   d. Every adult American will be literate

   e. Every school will be free of drugs and violence

6. **A Nation Prepared** - Carnegie report in 1986 asserted the need to "restructure school to provide a professional environment for teachers, freeing them to decide how best to meet state and local goals for children while holding them accountable for progress."

7. **The Outstanding Schools Act of 1993** - The Outstanding Schools Act of 1993, signed into law by Governor Mel Carnahan on May 27, 1993, after passage with bipartisan support in both houses of the Missouri legislature, dramatically improves public education throughout the state. It increases Missouri's financial investment in education by more than $360 million a year over FY 1993 funding, but more importantly, it sets into motion a series of carefully planned and thoughtfully orchestrated reforms designed to transform Missouri's school system into a model of educational excellence.

8. **Tech-Prep and the Perkins Act** - Tech-prep Education is addressed in two different segments of the Carl D. Perkins Vocational and Applied technology Act of 1990.

Title II, Basic State Grants, Section 235, Uses of Funds: The law identifies a Tech-Prep program as an allowable expenditure providing it meets three requirements:

1. The size, scope and quality to be effective
2. The integration of academic and vocational education through a coherent sequence of courses
3. Equitable participation for special populations

Title III, Special Programs, Part E: Tech-prep education receives major emphasis under Title III and the law emphasizes two purposes:

1. "To provide planning and demonstration grants to consortium of local education agencies and post-secondary educational institution, for the development and operation of 4-year programs designed to provide a Tech-Prep program leading to a 2-year associate degree or a 2-year certificate."

2. "To provide in a systemic manner, strong, comprehensive links between secondary and postsecondary educational institutions."

9. **School-to-Work Opportunities Act** - On May 14, 1994, President Clinton signed the STW Opportunities Act into law. The purpose of the Act was to develop a nationwide school-to-work system to address the serious skills shortage in our Nation's youth entering the workforce. The end result was unprecedented cooperation between the Department of Labor and the Department of Education. The goal is to insure students have a seamless transition from secondary education into meaningful, high-quality employment and/or further education.

10. **A+ Schools Program** - A provision of S.B. 380 is the A+ Schools program. The program is designed to provide high school students in the state of Missouri with an exciting and rigorous program of academic and technical education that leads to community college or workplace skill development. The Outstanding Schools Act establishes the A+ Schools program to provide grant awards to Missouri's public secondary schools that demonstrate a commitment to insure that:

1. All students be graduated from school

2. All students complete a selection of high school studies that is challenging and for which there are identified learning expectations

3. All students proceed from high school graduation to a college or postsecondary vocational or technical school or high-wage job with work-place skills development opportunities.

Farmington School Case Study

Like many teachers in Missouri, **Farmington High School teachers, Charles Cole and Art Daniels,** decided to offer an integrated course a few years ago. But what's different about the course Cole and Daniels teach is who came up with the idea in the first place - "their students."

A few years ago, some of the students in Cole's Sociology course were also enrolled in Daniels' Advanced Biology class. They noticed a number of similarities in the subject matter. But they didn't think much of it until they began to get differing opinions from the teachers in the two classes.

"They got excited," remembers Daniels. "We seemed to have a difference of opinion between social science and natural science." As an example, Daniels notes that what Cole teaches as "learning," he explains as part of "brain chemistry."

"We were covering the same things," says Cole. "We got to talking about the idea: wouldn't it be neat to have the same kids for the same two-hour block? (So) that's what we did." In the class, Cole and Daniels not only acknowledge their differences in interpretation—they accentuate them.

"They have debates," Kristen, a senior, says of the teachers. She says the students "have to research both sides so we can write reaction papers." Kristen and her classmates seem to enjoy this different approach to learning. "It's created a really good learning environment," offers Brad, also a senior.

But things haven't changed entirely. "We still have tests like (we used to)," says Daniels, "but we threw in some new forms of assessment—like the reaction papers," where students might respond to "a debate, a movie, a discussion." For assessment purposes, the teachers "formed reaction paper rubrics," as well as rubrics "for precis papers, term papers, spreadsheet/database projects," and the like. In addition, adds Cole, "students do a lot of self-assessment, or assessment of other groups of kids."

The success of Cole and Daniels' integrated course has been one factor in the decision to systematically implement integrated academics throughout the school. Another has been the work done by **Farmington's A-plus Schools coordinator, David Cramp**.

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In 1991, Cramp, who had already served as a classroom teacher as well as an elementary- and high-school principal, assembled fifteen teachers who drafted a list of "postulates of education" for Farmington. Two important recommendations of the teachers were the promotion of interdisciplinary instruction and the establishment of an integrated curriculum.

The recommendations made sense to many Farmington High teachers. "Pretty soon language arts and business (teachers) began to work together," and science teachers began to indicate interest, Cramp recalls. "The next year, we began social studies and language arts team teaching current events." Then came the course Cole and Daniels teach. This was a move in the right direction—and a successful one, says Cramp. But to Cramp, it was really just the beginning.

"Now we're on the verge of entering the project. People are scared, but they also embrace the change," he says. "The project" is an integrated ninth- and tenth-grade curriculum based on American history beginning with Reconstruction and ending after World War II. "I, first of all, had to have the support of the teachers," says Cramp, noting that after the successes of the stand-alone integrated courses, "now we're at the point where there are plenty of teachers interested...now the teachers went to work on the integrated curriculum. It's taken three, four, five years."

Teachers will work in teams of three to deliver the integrated curriculum. Each team will include a science, social studies, and language arts teacher. In addition, a math teacher will act as a resource person, and groups of art, music, and industrial technology teachers will act together to integrate an arts curriculum with the American history theme.

"It's going to be a big shift," says biology and ecology teacher Ron Jack. "But what we've heard from schools that are doing it is that they like it—it works, and it makes it easier on them." It also makes sense, Jack says.

" I know, from seeing my own kids, there were a lot of times when they were writing two or three papers at once. They were writing an English paper, a social studies paper, (and doing) a research paper for science. I always thought to myself, why can't we make this one paper, one research project. Make the project science or social studies or language arts—it doesn't matter what the topic is." Jack views integrating the curriculum "as letting kids have a better understanding," rather than having them do three unrelated things at once.

One major obstacle to successful integrated instruction is the necessary reconsideration of assessment. "There are a lot of variables involved," says Cramp. "Our assessment is becoming more authentic," he says, but adds that the teachers are still working on developing an overarching program of assessment.

Language arts teachers, who have been at the forefront of the changes at Farmington High, have been revising their assessment procedures over the past few years.

Language teacher Marlene Ragland has found that rubrics are of value to her and her students. "I never assign any kind of project without (handing out) a rubric in advance," Ragland says. Some language arts assessment "is subjective, and that's why to assess, the teacher has to know what he's looking for...he has to be able to verbalize it, put it in writing," she says. In integrating her curriculum with that of another teacher, Ragland says she "soon learned that for the students to feel as though we were really integrating, then (the other teacher) and I had to get together on the rubric. Assessment," she says, " is not the role of just one teacher."

What about next year, when three teachers will be integrating three different traditional subjects? Ragland predicts that the use of rubrics and performance assessment will actually ease the integration. Since these alternatives to traditional assessment require that firm objectives be in place at the onset, she says that performance assessment itself "will be combining all three disciplines into one."

But Ragland suggests that since students are not accustomed to newer assessment techniques, "you have to be sure not to performance-assess students to death." Ragland's colleague Mitsy Mitkiff seems to agree. Although her use of alternative assessments has steadily been increasing, she has not completely abandoned more traditional means of evaluation. "I still give the occasional objective test," she says.

Nonetheless, as 28-year veteran **language teacher Beth Stamel** puts it, changes in assessment procedures represent "a complete turnaround from what we have been doing."

"This is going to put the accountability on the teachers," says Cramp. This is especially true, he says, when teachers work in teams. "If you're going to be working with two other teachers," he says, "you have a responsibility to the others." Teachers also have a responsibility to their students to work together as a team "when performance assessment is coming up." "We found this in industry—with the quality-team approach, effectiveness is enhanced."

Social studies teacher Charles Cole welcomes this more authentic means of assessing teachers. "My idea is you tell me the competencies, turn me loose, and I'll make sure those competencies are reached," he says. "You'll find out at the end when you assess me."

Cole's partner Daniels admits that, as opposed to more traditional forms of student evaluation, authentic assessment is tougher. You have to be more creative—bubble tests don't really work so well anymore. ...(Authentic assessment) takes more time—no two ways about that."

But their students appreciate it.

Chad, for example, has the second highest GPA in the school. But despite his success, he feels that "the traditional stuff gets boring. You just tune it out." "In one ear, out the other," adds his classmate Brad. "In other classes you just sit there, and it's like, come on!" says April, who, like Chad and Brad, is a senior. "I learn more here."

Their classmate David puts it another way. "I like the class for the reason that you get an overview of biology and psychology, rather than 'it's cut-and-dried here and it's cut-and-dried there.' I had no idea how these guys were going to relate these classes. But right away you could see how they relate, overlap . . . I think we have a strong background for when we start to take science classes" (in college), he says.

"We knew all along that there were students where the bell rang and they put science away and went to math," says Cramp. "We were asking the students to bridge the gaps on their own." If students hadn't noticed the connections between Cole's and Daniels' courses, it may have taken them longer to integrate their subjects. But the students aren't the only ones who appreciate the connections.

"It can be a problem when (teachers) don't look at what the other disciplines have to offer," says Cole, who says that since he began teaching with Daniels, "I have developed a greater appreciation for science." Actually, it sounds like more than an appreciation. "If I had to do it all over again, I'd be a science teacher!"

ASSESSMENT AND INTEGRATION

Introduction

In recent years, many new and exciting new forms of assessment have been developed. These include tools such as portfolios, performance samples, rubrics, various forms of checklists, experiments with alternatives to traditional report cards, and much more. As discussed in previous sections, the current climate of education reform has focused on important dimensions such as:

- THE DEVELOPMENT OF HIGHER ORDER THINKING SKILLS SUCH AS PROBLEM SOLVING AND CRITICAL THINKING,
- MOTIVATING STUDENTS,
- EMBEDDING LEARNING WITH CONTEXTS THAT CONNECT WITH THE REAL WORLD EXPERIENCES OF STUDENTS,
- HELPING STUDENTS BECOME MORE REFLECTIVE ABOUT THEIR LEARNING INCLUDING ESPECIALLY AN AWARENESS OF THEIR THINKING PROCESSES AS WELL AS THE MEANINGFULNESS OF THEIR LEARNING FOR THE REAL WORLD, AND PERHAPS MOST IMPORTANT,
- HELPING STUDENTS INTEGRATE THEIR LEARNING ACROSS THE DIVERSE TYPES OF INFORMATION THAT THEY ARE ENCOUNTERING IN THE LABS AND CLASSROOMS.

This last point is one of the most important. Our schools are faced with the monumental task of preparing students for a world where new information is expanding at almost unthinkable speed. The computer has made it possible to access far more information than the human mind can comprehend. Memorization of facts simply will no longer do, if in fact it ever really did.

Thus, our schools must be prepared to education students for a world that doesn't yet exist. The workplace of the future will consist of many occupations and skills that have not even been thought of yet. For example, M. James Bensen (president of Bemidji State University in Minnesota) tells of a Midwestern company that specializes in the development of powdered substances, largely in response to the needs of the aerospace industry. Among the many substances that the company has successfully "powdered" is water! Powdered water! All you do is heat it up and it turns to liquid. Who could have imagined this type of product or skill even a few years ago?

Our schools must be prepared to help our students aim at a moving target. It will no longer do to open students heads and "pour in the facts."

Students must:

- BE ABLE TO CONNECT, WEAVE, AND INTEGRATE INFORMATION TOGETHER INTO MEANINGFUL CONFIGURATIONS,
- LEARN HOW TO APPLY LEARNING TO MEANINGFUL CONTEXTS,
- BE ABLE TO LOCATE AND ACCESS INFORMATION FROM A VARIETY OF SOURCES,
- DEVELOP SKILLS IN MONITORING THEIR OWN THINKING AND LEARNING PROCESSES,
- LEARN HOW TO LEARN NEW THINGS, BECAUSE FUTURE CHANGE IS A VIRTUAL CERTAINTY, AND
- BE EQUIPPED AND MOTIVATED TO LEARN HOW TO LEARN.

This is indeed a tall order for our schools! But it is the future and we must be prepared to respond.

Clifford Hill and Eric Larsen (1992) have described two different models of education that have important implications for the integration of learning across academic and vocational education. They use the terms ***endogenous*** and ***exogenous*** models of education. The endogenous model views education from ***within the educational system*** whereas the exogenous model is focused from the perspective of ***what is valued and needed by society***.

The two models can be contrasted in the following manner:

ENDOGENOUS MODEL

CURRICULUM DIVIDED INTO FAMILIAR ACADEMIC DISCIPLINES (MATH, SCIENCE, HISTORY, MUSIC, ETC.).

INTELLIGENCE AND **ACHIEVEMENT** DEFINED IN TERMS OF VERBAL (READING AND WRITING) AND ANALYTICAL ABILITIES.

ASSESSMENT TYPICALLY RESTRICTED TO SINGLE SESSION, END OF INSTRUCTION, TIME-RESTRICTED TESTING.

THE **ASSESSMENT PROCESS** IS MANAGED AND CONTROLLED BY THE TEACHERS.

EMPHASIS ON TESTING STUDENTS IN EXACTLY THE SAME MANNER USING TOOLS THAT TEND TO FAVOR THOSE WITH GOOD WRITING AND MEMORIZATION SKILLS.

TESTING PRIMARILY DESIGNED TO **ASSESS STUDENT ACHIEVEMENT** AT THE END OF INSTRUCTION.

When you have measurement, you have performance.

When you have no measurement, you have no excuses.

-Peter Drucker

EXOGENOUS MODEL

CURRICULUM ORGANIZED AROUND THE NEEDS OF SOCIETY AND THE DEVELOPMENT OF SPECIFIC COMPETENCIES (INTEGRATED TOPICS, WORKPLACE ISSUES, SOCIETAL ISSUES, TECHNICAL & SOCIAL PROBLEMS, REAL WORLD APPLICATIONS, ETC.).

INTELLIGENCE VIEWED IN MULTIPLE WAYS INCLUDING PROBLEM-SOLVING,

CONCRETE, & APPLIED ABILITIES.

ASSESSMENT TENDS TO BE FORMATIVE AND AN ONGOING COMPONENT OF THE LEARNING AND INSTRUCTIONAL PROCESSES.

STUDENTS ARE ACTIVELY INVOLVED IN THE ASSESSMENT PROCESS.

OPENNESS TO ALTERNATIVE FORMS OF ASSESSMENT THAT ACCOUNT FOR INDIVIDUAL LEARNING & EXPRESSION STYLES AS WELL AS TOOLS THAT CAPTURE STUDENTS' ABILITY TO CONNECT AND APPLY THEIR LEARNING TO REAL WORLD SITUATIONS.

ASSESSMENT DESIGNED TO BE **DIAGNOSTIC**, **PRESCRIPTIVE** AND **AUTHENTIC**.

Adapted from Hill, C., & Larsen, E. (1992). *Testing and assessment in secondary education: A critical review of emerging practices.* National Center for Research in Vocational Education, University of California at Berkeley, 1995 University Avenue, Suite 375, Berkeley, CA. Supported by The Office of Vocational and Adult Education, U.S. Department of Education.

Challenges & Trends for Assessment

Assessment is a cornerstone of education reform in the 90s: the President's education agenda; America 2000; the National Education Goals set by the governors; concerns for international competitiveness; renewed calls for restructuring and accountability at the state, local, and school levels. These initiatives ask that we set our sights on excellence and track our progress toward attaining it for individual students... and for the nation. (Herman, Aschbacher, & Winters, 1992, p. 1)

This quote captures the importance, urgency, and heavy demands that are being placed on assessment structures. The emphasis on integrated learning, higher-order thinking skills, student performance, problem-solving, and learning to learn presents some unique challenges for assessment. Assessment as ***end of unit*** testing of facts simply will not do! Around the nation and the world, new tools and perspectives are being developed that are designed to expand on traditional notions of what it means to assess students. These major trends and significant challenges include:

- SHIFTING THE EMPHASIS FROM "END OF INSTRUCTION" SUMMATIVE ASSESSMENT TO "IN PROCESS" FORMATIVE ASSESSMENT PROCEDURES;
- "BLURRING" THE SHARP DISTINCTIONS THAT HAVE EXISTED HISTORICALLY BETWEEN INSTRUCTION AND ASSESSMENT (TO INCLUDE ASSESSMENT AS PART OF THE INSTRUCTIONAL PROCESS);
- DEVELOPING ASSESSMENT PROCEDURES AND TOOLS THAT CAPTURE STUDENTS' ABILITIES TO THINK CRITICALLY, SOLVE PROBLEMS, CONNECT THEIR LEARNING WITH OTHER LEARNING, AND EXTEND THEIR LEARNING TO REAL WORLD APPLICATIONS;
- STRUCTURING ASSESSMENT SUCH THAT STUDENTS BECOME MORE INVESTED IN THE PROCESS OF ASSESSING THEIR OWN LEARNING (INCLUDING BECOMING MORE INVOLVED IN THE PROCESS OF IDENTIFYING, FOCUSING, AND SELECTING

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THEIR OWN EDUCATIONAL GOALS AND OBJECTIVES);

- DEVELOPING REPORTING MECHANISMS THAT ARE CAPABLE OF CAPTURING AND COMMUNICATING THE RICHNESS OF STUDENT PERFORMANCE AND ACHIEVEMENT;
- DEVELOPING ASSESSMENT TECHNIQUES THAT FOCUS ON THE CRITICALLY IMPORTANT AREA OF COLLABORATIVE SKILL DEVELOPMENT. ELEMENTARY LEVEL STUDENTS WORK TOGETHER A LOT. AS THEY MOVE THROUGH THE YEARS, THE TRADITIONAL EMPHASIS HAS BEEN ON INDIVIDUAL PERFORMANCE. IN RECENT YEARS, VOICES FROM THE BUSINESS AND INDUSTRIAL SECTORS HAVE SIGNALED THAT THE SCHOOLS NEED TO PREPARE STUDENTS TO WORK TOGETHER AND TO COMMUNICATE WITH A VARIETY OF DIFFERENT PEOPLE (BOTH LOCALLY AND ABROAD). ASSESSMENT PRACTICES MUST BE DEVELOPED THAT ASSESS GROUP PROCESS AND COLLABORATIVE ACTIVITY;
- ASSESSMENT PROCEDURES MUST BE DEVELOPED THAT REACH BEYOND WHAT STUDENTS KNOW (COGNITIVE DEVELOPMENT) TO WHAT THEY ARE CAPABLE OF DOING (PSYCHOMOTOR)

Outstanding Schools Act Mandate

One of the essential elements in any successful assessment system is the degree to which instructional goals have been established. Assessment in the absence of clearly establish d goals and objectives is haphazard, non-directed, and unfocused. The more clearly formulated goals and objectives are from the beginning, the more likely it is that you and, more important, your students will know when they have been achieved.

Through the Outstanding Schools Act (Senate Bill #380) in Missouri, the wheels were set in motion to accomplish this clarification of goals. At the highest level, the goals of the Act are to:

- IMPROVE THE QUALITY OF INSTRUCTION IN OUR PUBLIC SCHOOLS, AND
- RAISE THE PERFORMANCE OF ALL MISSOURI STUDENTS TO A HIGHER STANDARD.

The Outstanding Schools Act is the legislation which specifies the requirements which will guide the development and implementation of the Performance Based Approach to education across Missouri. The Act directs "the State Board of Education to adopt no more than 75 "academic performance standards" which:

- ESTABLISH THE KNOWLEDGE, SKILLS AND COMPETENCIES NECESSARY FOR STUDENTS TO SUCCESSFULLY ADVANCE THROUGH THE PUBLIC SCHOOL SYSTEM;
- LEAD TO OR QUALIFY A STUDENT FOR HIGH SCHOOL GRADUATION;
- PREPARE STUDENTS FOR POST-SECONDARY EDUCATION OR THE WORKPLACE OR BOTH; AND
- ARE NECESSARY TO PRESERVE THE RIGHTS AND LIBERTIES OF THE PEOPLE.

These goals and performance standards are in the process of being finalized and will form the core focus of what teachers will need to be prepared to assess. *For additional information on the drafted Missouri State Goals and Performance Standards see the publication entitled, Academic Performance Standards: An Interpretive Guide, May 1994.*

Another key aspect of the legislation is the requirement that the State Board of Education develop a statewide assessment system designed to determine the degree to which students are proficient in the knowledge, skills and competencies represented by the state-defined academic performance standards. The assessment system must, through a variety of means, be designed to determine the degree to which the state's goals and performance standards have been achieved.

Thus, at the "biggest picture" level, it is critically important that student and program assessment in Missouri be conducted and articulated within the larger context of the State's.

Goals and Performance Standards. It is also imperative that those assessment techniques be developed with a sensitivity to:

- THE INTEGRATIVE NATURE OF THE STANDARDS, AND
- THEIR PERFORMANCE (WHAT STUDENTS ARE CAPABLE OF DOING) ORIENTATION.

Excerpted from *Summary of Major Provision of The Outstanding Schools Act*, Missouri Department of Elementary and Secondary Education, June 17, 1993; and *Academic Performance Standards for Missouri Schools: An Interpretive Guide* (Draft), May 1994, Missouri Department of Elementary and Secondary Education.

Focus and Organization of the Assessment Component of this Handbook

Historically, assessment has come last. It is the final step in the educational process. The lesson is conceived, prepared, delivered **and then**, just before moving on to something else, the students are **tested!** As such, it is unfortunate that this section dealing with assessment is placed at the end of this Integration Handbook. If the information that follows is successful, it will be clear that assessment should be appropriately viewed as a "process" that should be **integrated** throughout the entire educational process. Assessment should be viewed as comprehensive and systemic. It should be continuous and ongoing. Assessment issues should help ***drive*** and ***focus*** instruction. Assessment should provide formative information ***during*** the instructional process, and it should provide ***feedback*** at the end.

This section of this Integration Handbook was specifically designed to provide assistance to teachers, administrators, students, parents and others who are involved in the assessment process. Stated

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more directly, this section is designed for ***everyone*** who is involved in schooling and education, because assessment (properly conceived) is one of the most critical elements in the development and delivery of integrated learning and instruction.

As such, this section will be subdivided into three major components.

1. Student Assessment. This first component will be the largest and will provide some background on emerging trends, practices, and tools that are appropriate for assessing integrated learning. In addition to the ideas that are presented, we have selected, adapted and developed some samples of assessment tools that we hope will trigger ideas of your own. We hope that you will adapt our ideas and use them as springboards to developing your own.

2. Teacher Assessment. This component is designed to describe and then extend the procedures for assessing teacher performance to integrated teaching and learning contexts. As with student assessment, development of procedures and guidelines for teacher evaluation can serve as a mechanism for facilitating the growth of teachers in developing integrated teaching abilities and approaches to teaching. This component is designed to address and provide practical suggestions for (a) administrators in assessing their teachers and (b) teachers in assessing their own implementation of integrated teaching techniques.

3. Program Assessment. This is the most systemic and comprehensive level of assessment. The focus of this component will be on evaluating the effectiveness of entire educational systems in facilitating integrated learning. This component will provide some helpful ideas and tools that were designed to assist administrators, department chairs, curriculum coordinators, and other key leaders in assessing the system as a whole.

Assessing the Student

The Authentic Approach to Assessment

One of the most exciting and promising approaches to assessment to grow out of the performance standards approach is what has been called ***authentic assessment***. Authentic assessment refers to a wide variety of measurement techniques which are designed to correspond as closely as possible to ***real world*** student experiences. The emphasis is on "real world." The more "real world" the better!

Testing vs. Assessment

In many respects, the authentic approach to assessment requires that everyone involved in education (including students, teachers, administrators, parents, etc.) rethink some traditional notions about what assessment is and how it should occur. For many, if not most, the term "assessment" is really a code word for "test." The mere mention of "test" will predictably trigger groans, increased blood pressure, and anxious questions about "what's going to be on the test?" Most students see testing as an event which is quite distinct from the rest of their learning experience. It is something that happens on a special day, at an appointed hour. Lessons, labs, teaching and all the rest come to a halt. Students are separated from each other. Everything gets quiet and the atmosphere is typically full of anxiety and even anger.

The authentic approach to assessment represents something distinctly different from traditional testing. Rather than being a kind of contrived event which occurs at a certain point in time (designed to produce a single score or product), authentic assessment instead becomes an ongoing and integral part of the whole teaching and learning process. The single (and often dreaded) testing event mentally shifts to assessment as woven throughout the entire educational process. In a nutshell, the authentic and process approaches to assessment blur the lines between learning, teaching, and assessment. These components merge together as a coherent whole rather than being artificially compartmentalized. The emphasis on "end of instruction" and "proof of learning" decision-making shifts to active, ongoing, process-oriented interactive experiences that are designed to improve student growth over time.

Certainly, this makes sense to many educators. For years, something similar to authentic assessment may have occurred in the form of, what has been termed, informal assessment. We have assessed

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projects (products of student work using some kind of criteria). Students have been observed while working in science, art, and vocational laboratories and classrooms with an eye on safety, craftsmanship, use of correct procedures, quality of interaction with other students, and much more. All of these represent, to some degree, alternative approaches to assessment.

Characteristics of Alternative Assessments

As has already been noted, there is a wide range of tools and procedures that have been developed for authentic assessment (portfolios, demonstrations, performances, exhibits, rubrics, etc.). These authentic assessment tools share some things in common that are worth considering as teachers strive to make the most of their assessment of students. Authentic assessment tools should:

- BE CONNECTED WITH AN ACTIVITY OR EXPERIENCE THAT IS MEANINGFULLY CONNECTED TO THE STUDENTS "REAL WORLD" RANGE OF EXPERIENCES;
- BE ACTIVE. STUDENTS SHOULD BE ENGAGED IN DOING, PERFORMING, MAKING, DEBATING, ETC.;
- PROBE THE STUDENTS' ABILITIES TO INTEGRATE AND CONNECT THEIR LEARNING, NOT ONLY ACROSS THE VARIOUS ACADEMIC AREAS BUT EXTENDED TO REAL WORLD APPLICATIONS, CAREER INTERESTS, AND FUTURE LEARNING;
- EXPLORE STUDENTS' HIGHER ORDER THINKING SKILLS SUCH AS PROBLEM-SOLVING, CRITICAL THINKING, ABILITY TO APPLY, ETC.;
- RETAIN THE IMPORTANT DIMENSIONS OF HUMAN JUDGMENT AND SUBJECTIVITY AND SHOULD BE EVALUATED BY REAL PEOPLE;
- INVOLVE STUDENTS IN THE PROCESS OF IDENTIFYING, CLARIFYING, SELECTING, EDUCATIONAL GOALS AND COMPETENCIES AS WELL AS HELPING THEM LEARN HOW TO ASSESS THEMSELVES IN LIGHT OF MEANINGFUL GOALS AND COMPETENCIES.

SO, WHAT ARE THE KEY CHARACTERISTICS AND DESIGN FEATURES OF AUTHENTIC ASSESSMENT? AUTHENTIC ASSESSMENT TOOLS ARE DESIGNED TO:

- MIRROR OR SIMULATE REAL LIFE ACTIVITY, WHERE STUDENTS ARE ENGAGED IN SOLVING REAL LIFE PROBLEMS;
- CONTINUOUSLY INVOLVE STUDENTS IN THE ASSESSMENT PROCESS THROUGH BOTH PEER AND SELF ASSESSMENT;
- EXAMINE THE PROCESSES (HOW STUDENTS SOLVE PROBLEMS, HOW THEY THINK, THE DEGREE TO WHICH THEY CONNECT LEARNING WITH OTHER LEARNING, THEIR ABILITY TO APPLY AND EXTEND THEIR LEARNING TO THE REAL WORLD, ETC.) AS WELL AS THE PRODUCTS OF LEARNING (SUCH AS WRITING SAMPLES, ART DISPLAYS, MUSICAL PERFORMANCES, CONSTRUCTED ITEMS, COMPLETED PORTFOLIOS, ETC.); MADE TO EVALUATE STUDENTS IN THE SAME KINDS OF COMPLEX, CHALLENGING, AND UNCLEAR SITUATIONS THAT THEY WILL FACE IN THE REAL WORLD. THIS INCLUDES LEARNING HOW TO CLARIFY PROBLEMS,

In a recent national study of middle schools conducted by University professor Jerry Valentine, more schools began integrating curriculum and using interdisciplinary team teaching during the past decade. Valentine's study notes that this type of teaching benefits both teachers and students by contributing to a more positive school climate. Integrated teaching provides more opportunities for students to socially bond with peers and teachers, encourages student creativity, develops a sense of community within a school and encourages critical thinking.

-Jerry Valentine, Columbia

KNOWING HOW AND WHERE TO GO TO LOOK FOR INFORMATION, BEING ABLE TO TRANSFER AND APPLY THEIR LEARNING TO SIMILAR (BUT DIFFERENT) SITUATIONS;

- PROVIDE MULTIPLE SOURCES OF INFORMATION TO PROVIDE FEEDBACK ON STUDENT GROWTH IN NUMEROUS SITUATIONS OVER TIME;
- BLUR THE LINES BETWEEN LEARNING, TEACHING, AND ASSESSMENT WITH AN EMPHASIS ON CONTINUOUS, FORMATIVE, AND PROCESS BASED ASSESSMENT...WHERE LEARNING AND ASSESSMENT HAPPEN SIMULTANEOUSLY WITH LOTS OF INTERACTION BETWEEN TEACHERS AND STUDENTS; AND
- CONNECT WITH SELECTED CRITERIA WHERE A VARIETY OF ASSESSMENT TOOLS ARE USED TO DETERMINE THE EXTENT TO WHICH STUDENTS HAVE MET THE GOALS AND OBJECTIVES WHICH HAVE BEEN TARGETED FOR A GIVEN LEARNING EXPERIENCE

Adapted from Herman, Aschbacher, & Winters, 1992; Wiggins, 1993.

Authentic assessment has been defined as "approaches to assessment which are designed to correspond as closely as possible to 'real world' experience" (Dalheim, 1993). The authentic approach requires that everyone involved in education (including students, teachers, administrators, parents, etc.) rethink some traditional notions about what assessment is as well as how and where it should occur. Rather than being a kind of contrived event which occurs at a certain point in time (designed to produce a single score or product), assessment instead becomes an ongoing and integral part of the whole teaching and learning process. The single (and often dreaded) "test day" mentally shifts to assessment as woven throughout the entire educational process. Rather than being summative (designed to assess student performance at the end of instruction) assessment instead becomes formative (dynamic, interactive, and ongoing).

The bottom line is that assessment need not be a high-threat, "isolated from learning" event that teachers do "to" students. Instead it should be a natural part of the learning process, woven throughout the richness of classroom interactions using a diverse set of tools (portfolios, rubrics, informal and formal observation, peer, self, and group assessment, writing samples, process and product assessment, and much more). Assessment should be an open, engaging and interactive process which occurs "with" students and between them and their peers. The contrast between traditional and authentic assessment has been summarized in the following example (Figure 1). (Hipps, 1983)

Traditional Assessment	Authentic Assessment
1. Typically limited to **tests**	1. Includes a **wide variety of methods** and tools (including observation, interaction, peer and self assessment, portfolios, rubrics, projects, video, etc.)
2. Teacher **over** and **apart from** students	2. Teacher **with** students
3. Focus on **single subject** or topic	3. Multidimensional and/or **multidisciplinary** focus
4. **Narrow** and **specific**	4. **Broad** or **holistic**
5. An event **separate from** teaching and learning processes	5. **Woven into** and **throughout** the teaching and learning process
6. Usually occurs at **end of instruction** for grade giving purposes	6. Occurs **during all phases** of the teaching and learning processes
7. Teacher-student **interaction inappropriate** and discouraged during assessment	7. Teacher-student **interaction appropriate** and encouraged during assessment
8. Results in a **final number** or grade	8. **Rich and multidimensional** (necessary to present in a variety of formats - difficult or impossible to reduce to a single grade or number)
9. **Assessment restricted** to responses to instrument.	9. **Teacher can probe** and clarify student knowledge
10. Evaluation primarily conducted by **teacher**	10. Encourages **self** and **peer** evaluation
11. Data collection **constrained** by instrumentation	11. **Flexible** and rich data collection
12. Emphasis on **objectivity**	12. Emphasis on **flexibility**
13. Concerned with **validity, reliability, generalizability**	13. Concerned with **credibility, confirmability,** and **transferability**
14. Tasks designed to assess **in-school knowledge** and/or performance	14. Connected to and selected from **real world tasks**
15. **Highly structured**	15. **Flexible structure**
16. Typically administered on a **group basis**	16. Typically administered on an **individualized basis**

Figure 1. Traditional vs. Authentic Assessment. (Adapted from Hipps, 1993)

Advantages of Authentic Assessment

It is critically important that authentic assessment procedures be subjected to critical examination. In other words, authentic assessment procedures should themselves be assessed! Some ideas might look good in theory but fail due to a number of implementation problems. The old saying "the devil's in the details" certainly holds true when it comes to developing and implementation alternative approaches to assessment.

Experts in assessment (Darling-Hammond, 1990; Neill & Medina, 1989; Newmann, 1991; Resnick, 1987; and Wiggins, 1991), generally agree on a set of three Big E's that should be used to assess the value of assessment tools and procedures. These are:

- Do they contribute to Educational Excellence?
- Do they insure Equity?
- Are they Efficient?

Each of these will be discussed briefly.

Excellence

- Do they require constructed responses rather than merely recognizing responses constructed by others? Students are forced to be constructive rather than reactive.
- Do they elicit higher order thinking skills from students? Too many traditional tests reduce the process to objective measures that can be easily graded. Most authentic measures retain the complexity and multiple response nature of real world learning environments.
- Do they employ direct assessment of holistic projects rather than relying on indirect assessment of learning? Experience has demonstrated that good test taking ability does not necessarily transfer to the ability to apply learning to real world contexts. One of the key strengths of authentic measures is that they are designed to assess students while engaged in meaningful holistic projects and activities.
- Are they integrated with classroom instruction rather than separated from it? As Wiggins observed (1989), if properly aligned with curriculum and instruction, assessment can become a powerful means of facilitating and motivating student performance.

Equity

- Authentic measures sample student performance over a more extended range of time than do traditional tests. Rather than restricting assessment to a limited framework of time at the end of a

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UNIT OF INSTRUCTION, MOST AUTHENTIC MEASURES ARE DESIGNED TO SERVE A FORMATIVE PROCESS BY EXAMINING PERFORMANCES REPEATEDLY OVER TIME. FOR EXAMPLE, LANGUAGE ARTS TEACHERS ARE WELL AWARE OF THE VALUE OF EVALUATING DRAFT MATERIALS PRIOR TO FINAL SUBMISSION.

- AUTHENTIC MEASURES TEND TO BE MORE CRITERION-BASED THAN DO THEIR TESTING COUNTERPARTS. IDEALLY THIS ACCOMPLISHES SEVERAL PURPOSES. IF CONDUCTED IN AN OPEN MANNER, IN FULL VIEW OF STUDENTS (WITH THEIR ASSISTANCE AND INVOLVEMENT), THE CRITERION REFERENCED APPROACH SHIFTS THE FOCUS FROM HOW STUDENTS COMPARE WITH ONE ANOTHER TO WHAT THEY HAVE LEARNED BY CLEARLY DEFINED AND MEANINGFUL CRITERIA. THE BOTTOM LINE ASSUMPTION OF THIS APPROACH IS THAT ALL STUDENTS CAN LEARN (ALTHOUGH PERHAPS NOT THE SAME THINGS OR AT THE SAME RATE). THE APPROACH THUS PROMOTES SUCCESS FOR GREATER NUMBERS OF STUDENTS.
- AUTHENTIC MEASURES TEND TO INVOLVE MULTIPLE EVALUATORS. WITH TRADITIONAL TESTING, THE KEYS TO THE EVALUATION VAULT RESIDE IN THE POCKET OF THE TEACHER. AUTHENTIC MEASURES OPEN THE PROCESS, AT A MINIMUM, TO SELF AND PEER-EVALUATION. PARTICULARLY IN HIGHLY INTEGRATED ENVIRONMENTS, IT IS ALSO POSSIBLE TO OBTAIN EVALUATIVE INPUT FROM WORKPLACE SUPERVISORS, OTHER TEACHERS, AND OTHER ADULTS. SIMPLY STATED, ALMOST ANYTHING IS BETTER UNDERSTOOD IF VIEWED FROM MULTIPLE POINTS OF VIEW. THE SAME IS CERTAINLY TRUE OF STUDENT PERFORMANCE.

Efficiency

One criticism of authentic assessment procedures is that they are time-consuming and inefficient. Isn't it more efficient to administer a test en-mass to a large group of students at a single setting than it is to observe and engage in regular and intensive interaction with students on an ongoing basis? What about the time-intensiveness of reviewing essay exams compared with the ease of running a multiple choice test scoring sheet through a scanner? Hill and Larsen (1992) assert that this is a superficial notion of what is meant by "efficiency." They continue by noting that traditional notions of efficiency "mask the massive inefficiency that arises in an educational system when fundamental goals are distorted by inappropriate methods of assessment."

If done properly, authentic assessment practices can help steer educational systems toward deeper, and more meaningful, forms of efficiency, where students' time is well spent on meaningful and engaging tasks. In this regard, authentic assessment practices can serve to promote the following goals for quality and efficient education:

- THEY CAN FORCE THE ISSUE OF CURRICULUM AND INSTRUCTIONAL REFORM AND ALIGNMENT.
- THEY CAN SERVE TO ENHANCE TEACHER PERFORMANCE AND FOCUS THEIR ENERGY ON THE KINDS OF STUDENT LEARNING AND PERFORMANCE THAT REALLY COUNT.

• THEY DEVELOP ABILITIES IN STUDENTS TO MONITOR AND ASSESS THEIR OWN LEARNING (WHICH HAS TREMENDOUS PRACTICAL IMPLICATIONS FOR EDUCATIONAL EFFICIENCY).

Standards for Quality Assessment Procedures

It is important to assess the quality of the performance of students, teachers, and entire programs. Indeed, that's what this entire section has been about. We have discussed the importance of doing this against carefully selected criteria. We have also attempted to stress the importance of using the "right tool for the job." Stated more directly, it is important to use more than one tool when assessing the full range of complex student abilities, performances, attitudes, aptitude and all the rest.

The same points should be made about assessing the value of the assessment procedures themselves. In much the same manner that there is a nationwide thrust toward developing standards for student performance, there is also a move to establish standards for assessment. The Center for Research on Evaluation, Standards, and Student Testing (CRESST) has developed a useful set of standards that should be considered whenever evaluations are being constructed and conducted. While these standards are primarily geared toward assessing students, they can also be applied quite effectively to assessing teachers and integrated programs. These standards (and some interpretation and description) are as follows:

- ***Consequences***. This concern involves thinking through, in advance, the potential consequences of an assessment procedure. Some excellent ideas that might look good in theory turn out to be bad practice. Among the questions that could and should be asked are: Will the assessment retain the complexity of what I am attempting to measure? Will it enhance or disrupt the learning process? How will I use the results?

- ***Fairness***. A key instructional and assessment issue has to do with fairness. Is the assessment procedure fair to all students? Are certain types of "intelligences" (for example, verbal and analytical abilities) consistently favored by my assessment techniques? Are my assessment tools sensitive to the differences in culture that are represented in my classroom? Are they fair to those whose primary intelligences are practical and applied?

- ***Transfer and Generalizability***. This concern relates directly to the need for instruments to be valid (measure what they are intended to measure) and reliable (measure the same way on a consistent basis). Are the results of my assessments really

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indicative of what students know and are capable of doing? If someone else were to assess the same students, either in the same way or using different tools, would the results be the same? What information is there in the assessment that tells me what else a student may be capable of doing?

• ***Cognitive Complexity***. One of the key features of authentic assessment procedures (particularly when used to assess integrated and connected learning) is that they be sensitive to the cognitive complexity of students. Does the assessment procedure capture my students' ability to think or have I only focused on facts? Does the tool provide some indication of their problem-solving ability as well as the processes they use to address problems? Is the assessment "process-sensitive"?

• ***Content Quality***. Most academic disciplines have developed, or are in the process of developing standards (certainly the Math standards have served as an exemplar). In vocational areas, there has been a long history of identifying and validating competencies for the various technical service areas. Teachers should ask: Do my assessment tools accurately connect with those standards that have been established for my teaching area? Is my assessment program aligned with the major goals and objectives for my area?

• ***Content Coverage***. One of the issues that is always present in assessment has to do with the degree to which an assessment program can (or should) measure the entire range of content. The typical procedure is to attempt to select representative samples of the wider range of content. Teachers should ask: Does this assessment cover the range of important content or performance, or is it too focused on one area? Am I tending to focus in on those areas that are more easily measured rather than those that are most important?

• ***Meaningfulness***. This criteria is at the heart of authentic assessment. Certainly one of the important trends in education over the past decade has been to engage students in meaningful, real-world tasks (contextual learning). As a result, the sharp distinctions that have traditionally existed between teaching and learning, and learning and assessment are blurring. Teachers should ask themselves: Are my assessment tools authentic, genuinely challenging and meaningful to my students? Are my assessment practices "real-world" related or do they tend to be artificial and remote to what students really need to know and be able to do in life?

• ***Cost and Efficiency***. As with any endeavor, there is always

the problem of transferring good theory into sound practice. Authentic assessment tools that are capable of accurately reflecting the higher-order thinking skills of students as well as their ability to connect, apply, and transfer knowledge might be great in theory but terrible in practice. Teachers should ask themselves: Is this tool realistic? Am I asking the right amount of work from students? Can I realistically manage the scoring of large numbers of students using a given assessment tool?

It should be clear that these criteria will mean different things to different teachers in different circumstances. Nevertheless, they form a useful standard that should be used to assess the value of individual assessment tools as well as the credibility and integrity of the broader assessment program. As with many other areas of integration, it will be valuable to process these standards, questions, and concerns with other teachers and potentially with students. At times, we may think that our assessment tools are more fair and authentic than they really are. An objective perspective from someone from another academic area can often prove to be invaluable.

Adapted from Linn, R. L., Baker, E. L., & Dunbar, S. B. (1991). Complex, performance-based assessment: Expectations and validation criteria. *Educational Researcher, 20*(8), 15-23.

Teaching to the Test

Teaching to the test! Historically, this has been one of the most commonly aired complaints leveled against testing programs, particularly the large-scale tests that were designed to assesses the quality of school districts. It is clear that this criticism has been warranted in those cases where important material has been excluded during the teaching process because the teachers knew that their students wouldn't encounter it on the test. In these cases, the practice of "teaching to the test" led to a restriction of what was taught, a focus on "essential" facts, a de-emphasis on education objectives, and a lack of concern for integration of learning across disciplines. The political concerns have taken precedence over the instructional process. These are serious problems.

Authentic assessment casts the issue in a very different and more positive light. The more appropriate way of thinking about the issue is from the perspective of curriculum alignment. Specifically, educational goals and objectives, lesson planning and delivery, activities, and assessment should be viewed as a coherent whole where each of the pieces are woven into the other.

• ASSESSMENT TOOLS SHOULD DETERMINE THE DEGREE TO WHICH STUDENTS HAVE ACHIEVED SELECTED PERFORMANCE STANDARDS AND LESSON OBJECTIVES.

- Lessons and activities should align with performance standards and objectives.
- Assessment criteria should be clear from the beginning of instruction, not only to the teacher but to students as well. In fact, it is often useful to engage students in the process of formulating their own assessment criteria.
- Assessment should occur (as much as possible) as a formative process throughout the entire instructional process. Indeed, formative assessment can itself serve as a valuable instructional tool.

When conducted in this manner, "teaching to the assessment" takes on positive meaning. Instead of reducing instruction to low-level factual information that will be covered on the test, assessment instead becomes a dynamic and energizing force that can facilitate the learning and curriculum alignment processes

When Assessment Fails

Assessment efforts are not always successful. Just as with most good tools, there are some "warning lights" that should be applied to assessment. While these may appear to be rather obvious, they nevertheless serve as important points of caution as the value of individual assessment items (or entire assessment programs) is evaluated. These are:

- Failure to capture what it is that students know and are capable of doing;
- Limiting the focus primarily to only the kinds of things that it takes to be successful in the school environment;
- Perpetuating biases including those that are culturally bound and those that favor certain types of intelligence over others (for example, verbal over applied);
- Failure to connect with the unit, course, program, or school system's goals;
- Neglect of bigger educational goals such as creativity, higher-order learning, ability to apply and integrate learning, etc.;
- Restriction of focus to the cognitive domain to the exclusion of the important doing (psychomotor) and attitudinal (affective) domains;
- Consistently using a single assessment tool or approach, particularly when it leads to the exclusion of more authentic approaches.

Adapted from *Student Engagement and Achievement in American Secondary Schools*, by Fred M. Newmann. New York: The Teachers College Press.

Prior to examining these, it is important that the discussion first focus briefly on the essential foundation of good rubrics and sound assessment...criteria (the goals and objectives which are being assessed). Within technology education, there is a tendency to fall into at least two types of "traps" which can blur or even destroy the essential foundation of good student assessment. These may be called the "project trap" and the "neat activity trap."

The "Project Trap"

Projects of many types (including science projects, multimedia presentations, computer exercises, constructed activities, manipulatives, games, simulations, and more) comprise an important activity base for education. In recent years, cognitive approaches to learning have stressed the importance of actively involving students in "constructing" their own learning. Projects work very well in this regard. They motivate students. They provide an excellent means of helping students apply, extend, and even create their knowledge. Parents like to see what their children are doing. Projects provide a means for putting knowledge and skill into practice. Good projects not only assist students in applying knowledge, they also facilitate the development of higher order analysis, synthesis, and evaluation skills.

It is very important that it be understood that the project method is extremely valuable. It represents, and will continue to represent, one of the most powerful teaching and learning tools available to educators. The danger (trap) occurs when the project becomes an end in itself. While projects of increasingly different types must continue to play an important role in education, it is critical that we not lose sight of the importance of clearly and specifically identifying the important performance outcomes which are being delivered and/or reinforced through the project method. From this perspective, the projects become excellent tools to be used in the delivery of selected performance criteria rather than ends in and of themselves.

The "Neat Activity Trap"

This trap is a close first cousin to the "project trap." As with the "project trap," the danger is one of simply buying in to what other teachers are doing without first giving some careful thought to the larger goals and specific competencies of the total educational program. How many times have you seen an activity being delivered

by a fellow teacher and thought "my students would really like this one" with little thought to the objectives that would be delivered through the activity? Certainly there is nothing wrong with wanting to motivate students through appealing activities. However, just as with projects, the problem is when the activity is delivered in the absence of an educational purpose or direction.

Authentic Assessment Tools

One of the classification schemes that is commonly used in assessment circles is to distinguish between "products" and "processes." Traditionally, more emphasis has been placed on the product side of student learning. This has been especially true in the core academic disciplines where assessment has consisted primarily of end of instruction testing. It is true that students are sometimes "required to show their work" (for example in mathematics) and that many writing teachers require several draft writing cycles. But the primary emphasis historically has been on assessing the final products of the educational experience.

Notable exceptions have been in the fine arts, athletics, and vocational education where more attention has been placed on assessing the processes. Some tools which are commonly used in authentic assessment (subdivided by type) are listed below. Keep in mind that some of these tools could actually fit into both categories depending on the way in which they are used by individual teachers.

Process Assessment

- INTERVIEWS (STRUCTURED OR UNSTRUCTURED)
- INFORMAL AND FORMAL OBSERVATIONS
- PEER ASSESSMENT (USING CRITERIA THAT THEY WERE INVOLVED IN DEVELOPING)
- SELF ASSESSMENT (CAN BE ORAL OR WRITTEN)
- PERFORMANCE OR AFFECTIVE CHECKLISTS
- ORAL EXAMINATIONS
- REFLECTIVE DEBRIEFINGS (WHERE STUDENTS EXPLAIN WHAT THEY WERE THINKING OR WHAT THEY WERE ATTEMPTING TO DO DURING SOME ACTIVITY)
- PROCESS SCORING RUBRICS
- OTHERS

Product Assessment

- PORTFOLIOS
- WRITING SAMPLES
- PRODUCT SCORING RUBRICS

- GROUP & INDIVIDUAL PROJECTS
- EXHIBITIONS TO DISPLAY ARTWORK, STUDENT PROJECTS, ETC. WITH ESTABLISHED RATING CRITERIA
- STUDENT PERFORMANCES (DANCE, DRAMA, ATHLETIC CONTESTS, ETC.) WITH ESTABLISHED RATING CRITERIA
- STUDENT COMPETITIONS
- INTERNSHIP ALBUMS
- OTHERS

Portfolios

Portfolios are one of the most widely used tools for authentic assessment. They provide an excellent mechanism for documenting student work. Used properly, they communicate , in a comprehensive way, what students have learned. They can contain a broad range of information, not only about student achievement, but about attitudes, socialization skills, and ability to connect learning to real situations.

Another important tool which is ideally suited for conducting authentic assessment is the Portfolio. Portfolios are packages of materials which students assemble as a means of communicating their interests and abilities to others (teachers, peers, potential employers, parents, and others). They may contain a wide variety of materials in a variety of formats including:

- PHOTOGRAPHS OF PROJECTS
- DRAWINGS
- TECHNICAL REPORTS
- DESIGN SKETCHES
- WORK PROGRESS JOURNAL
- TEACHER RECORDS ON STUDENT CONFERENCES
- STUDENT LOGS AND JOURNALS
- VIDEO
- TESTING RESULTS
- WRITING ASSIGNMENTS
- A RESUME
- PERFORMANCE STANDARDS PROFILE
- PRODUCT ASSESSMENT CHECKOFF SHEETS
- PROCESS ASSESSMENT CHECKOFF SHEETS
- OTHER ITEMS AS NECESSARY

The bottom line is that portfolios exist in as many forms as there

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are teachers and individual students. It is important, however, to note that these tools should not simply consist of "a place to dump" anything and everything loosely connected with a given course. Rather, their value as assessment tools is maximized only as they reflect thoughtful selection of items and categories as well as the careful organization and presentation of materials.

The portfolio should also be developed with a clear connection to identified and established performance standards and/or objectives for a course or unit of study. Otherwise it will amount to little more than a collection of "neat and interesting" materials rather than a coherent and well-focused documentation of student performance. At its best, a portfolio can represent an extremely rich portrait of student ability and interest. This is a valuable part of the process of student assessment.

Advantages of Using Portfolios

As suggested above, there are many advantages of using portfolios including:

- They are powerful tools for encouraging students to take responsibility for their own learning (self evaluation).
- They provide a means for including and identifying what kinds of learning are real and authentic for students.
- They prompt students to learn how to market their skills and knowledge.
- They can help connect doing, thinking, and writing.
- If properly done, they can serve as a connection or interface between instruction and assessment.
- They offer students the chance to think about learning (When students are encouraged to include evidence or by-products of what they have learned, this process of thinking about learning is encouraged).
- They provide an opportunity for an alternative and more comprehensive view of assessment. Most assessment consists of tests which occur at the end of units of instruction. These are designed to "peg" students at certain levels of achievement. Portfolios have the advantage of assessing learning while it is still in process. They can be used for diagnostic purposes and they can help students visualize and appreciate their progress and growth.

Some ideas adapted from Paulson, Paulson, and Meyer, 1991.

Tips for Developing and Managing Portfolios

"Where do I begin?"

"What kinds of practical tips should I keep in mind?"

This section presents some useful ideas which should be considered when attempting to develop and use portfolios as assessment tools.

- Involve students in the process of deciding:

  What will go into the portfolio,

  How to assess the quality of what is included.

- Make it an "in-process" document rather than just a collection of final products. Including draft materials provides a means for helping students see their progress over time. A primary purpose for maintaining a portfolio should be to document progress.

- The "in-process" quality of a portfolio rests on the notion that the student is going "from" somewhere "to" somewhere. This could be "from" not knowing how to do something "to" knowing how to do it and do it well. Consequently, portfolios should have a sense of direction or goals. It is a good idea for students to be asked to include a set of personal goals at the front of the portfolio which, in essence, identify "where they are wanting to go with the course" or "what they are hoping to accomplish." They should also be encouraged to update these "targets" as the school year progresses.

- As goals are updated, it is a good idea to retain the old goal statements so that students can see how these evolve over the time they're in the course.

- The portfolio should be logically organized by the student. A table of contents should be included at the beginning to assist in locating the materials. If students are allowed to simply "throw" anything and everything into the portfolio, much of the intentional and reflective value of the portfolio will be lost.

- Encourage students to include related materials which may not appear to be directly related to the particular course for which the portfolio is being developed. For example, almost any Technology Education course could include writing samples, related science or math assignments, results from interest inventories, employer interviews, etc. At their best, portfolios provide a mechanism for integrating Technology Education learning with what students are learning in other classes or on their part-time jobs.

- Encourage students to include reflective information, similar to a diary. This provides a means for encouraging students to develop critically important self-reflective qualities which are

necessary for judging their own work, reflecting on what kinds of activities they enjoy or find meaningful, and for thinking about potential career or educational decisions. If this is to be done effectively, provisions must be made for assuring confidentiality. If the entire class is allowed access to information that may be quite personal to a student, reflective activity will almost certainly stop.

- Teachers should make time to talk about the portfolio development process periodically with the class. It is not enough to assign portfolios at the beginning of a semester and then hope they are submitted in good form at the end. Since they are "in-process" documents, they must be discussed, reviewed, and used on a regular basis.

How Should a Portfolio Be Used?

The answer to this question depends on who is asking the question (students, teachers, administrators, guidance counselors, parents, etc.).

Value for Students

- SELF-EVALUATION
- PERSONAL GOAL SETTING
- SHOWING ACHIEVEMENTS WITH PARENTS AND OTHERS
- TO DEMONSTRATE ABILITIES TO POTENTIAL EMPLOYERS

Value for Teachers, Guidance Counselors and other School Personnel

- FOR USE IN CONFERENCES WITH PARENTS AND/OR STUDENTS
- AS A MEANS OF TRACKING STUDENT GROWTH OVER A PERIOD OF TIME
- TO MOTIVATE STUDENTS
- TO EVALUATE STUDENT PROGRESS ALONG NUMEROUS, MORE QUALITATIVE, DIMENSIONS (IN ADDITION TO THE RESULTS OF TESTS)
- AS A MEANS OF GETTING STUDENTS MORE ACTIVELY INVOLVED IN THEIR OWN LEARNING AND ASSESSMENT

• TO PROVIDE INFORMATION-RICH DOCUMENTATION OF STUDENT PROGRESS AND GROWTH

Sample Summative Scoring Format For Portfolio Components

Collection of Student's Work/Assignments	**50 pts.**
Cognitive Written Assignments (daily work)	
Laboratory Problem Solving Activities	15 pts.
Planning Guide for Projects	10 pts.
Psychomotor Assignments	
Affective Checklists	10 pts.
Process Evaluation Sheets	10 pts.
Product Evaluation Sheets	5 pts.
Collection of Teacher's Assessments	**50 pts.**
Cognitive Written Assignments (daily work)	
Term Papers/Research/Writing	10 pts.
Written Test Results	10 pts.
Psychomotor Assignments	
Affective Checklists	10 pts.
Performance Checklists	10 pts.
Process Checklists	10 pts.

Additional Considerations

It should be apparent that there are many situations in which portfolios can be used for purposes other than assigning grades. However, there is also the question of how a portfolio can be used for this purpose. Many approaches can be used and will depend, to a considerable degree, on the initial criteria which have been established (what to include, how the portfolio is to be organized, etc.) and the Performance Standards which have been selected for the course, unit, or lesson. To some degree, the portfolio's use will depend on whether it is being used as a tool for formative (in-process) or summative (at the end of instruction) assessment. In either case, it should be remembered that the value of portfolios (as assessment tools) ultimately depends on how carefully they are designed, maintained, and connected to objective criteria (or standards) which have been selected for a course. As with all assessment tools and techniques, they are designed to provide a means of clarifying and objectifying what it is that a student knows and is able to do. At the same time, portfolios

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have the distinct advantage of injecting rich, real-world data into the assessment process.

Performance Scenarios

Another tool which has been developed for problem-solving and assessment purposes is the Performance Scenario (sometimes referred to as Design Briefs. This approach consists of establishing a situation which a student (or students) is expected to solve. Typically, some criteria are given which can include some focus questions, requirements, design criteria, etc. Specific evaluation criteria may also be included and shared with the students when the assignment is given.

Scenario 1 - Design a "Smart Room"

You have been given the challenge of converting your bedroom into a "smart room." An allowance of $500 has been given to you to accomplish the project. You are to make sure that you include each of these considerations into your design:

- temperature control
- light control
- sound system control
- security

1. Where would you go to look for information on how to do certain parts of the design?
2. Who would be good suppliers for parts or components?
3. Illustrate and describe how the room is a feedback and control system.
4. Construct the system as designed.
5. What other kinds of possibilities do you think might be available in the future that aren't possible with today's technology?
6. Outline the steps you would take to design and carry out your plan.

Scoring Rubric

	Exemplary	Good	Not Yet
1. Number and quality of sources of information	☐	☐	☐
2. Number and quality of sources of supplies and devices	☐	☐	☐
3. Ingenuity and creativity of the design	☐	☐	☐
4. Used all four design criteria	☐	☐	☐
5. Quality of documentation	☐	☐	☐
6. Workability of the constructed system	☐	☐	☐
7. Quality of future possibility thinking	☐	☐	☐
8. Quality of systems model	☐	☐	☐
9. Remained within budget	☐	☐	☐

Scenario 2 - Bridge Building - Structural Engineering

The goals of the Bridge Building module are to:

- NAME AND DESCRIBE DIFFERENT TYPES OF BRIDGES,
- NAME AND DESCRIBE THE TYPES OF TRUSSES WHICH ARE TYPICALLY USED IN CONSTRUCTION,
- DESCRIBE AND DISCUSS THE PROPERTIES OF PHYSICS WHICH ARE USED IN TRUSS CONSTRUCTION,
- DEMONSTRATE CONCERN FOR QUALITY IN TRUSS CONSTRUCTION ACCORDING TO THE "TRUSS QUALITY RUBRIC."

What to do for an "A":

1. Pass the truss knowledge module posttest at 90% or above.
2. Construct and test a bridge which meets building specifications specified in the truss quality rubric.
3. Turn in all worksheets, sketches, and full-size drawing for evaluation (on time and with excellent quality - see worksheet and drawing assessment rubrics).
4. Accurately calculate the bridge's efficiency using the following formula:

$$\text{Bridge Efficiency} = \frac{\text{Maximum Weight Supported in Grams}}{\text{Weight of Bridge in Grams}}$$

What to do for a "B":

1. Pass the module posttest at 80% to 89%.
2. Construct and test a bridge which meets most building specifications.
3. Turn in all worksheets, sketches, and full-size drawings for evaluation (on time and with excellent quality - see worksheet and drawing assessment rubrics).

A student will be marked "N" if he/she:

1. Does not pass the modules posttest at 80% or above.
2. Does not finish and/or test a bridge.
3. Bridge does not meet building specifications.
4. Does not turn in worksheets, sketches, and full-size drawings for evaluation.

Students who receive a "N" will be expected to continue work on the unit until they have achieved either an "A" or a "B."

Adapted from a rubric developed by Mike Maxwell, technology education teacher at E. Buchanan, Gower, Missouri
Figure 3. Sample Technology Education Rubric.

Scenario 3 - Establishing a Company

Imagine you are the Corporate Executive Officer (CEO) of the Mega Toy Corporation. To stay in business you must continue to develop new products. Before you spend hundreds of thousands of dollars on next season's line, how would you go about developing a new product for your stores? (Use as many steps as you see fit.) (10 pts.

STEP 1:_____
STEP 2:_____
STEP 3:_____
STEP 4:_____
STEP 5:_____
STEP 6:_____
STEP 7:_____

Internship Albums

Many educational systems provide mechanisms for their students to engage in workplace internships. Much of the value of these experiences has to do with a variety of factors including degree of learning challenge and the quality of interaction with other personnel. One factor that is often overlooked relates directly to the documentation and assessment of the process. One useful tool for promoting student learning and reflection is to require them to develop Internship Albums. Among the kinds of information that could be required are:

- An identification of the student's goals for the internship. These should be written in the students own words. It is useful to encourage students to develop these in "rough draft" form during the planning stages of the internship. This forces them to begin to clarify their own expectations for the experience.
- Rationale for Internship Choice. Students choose internships for a variety of reasons. It is useful to have them include a brief reflective statement describing the reasons for their choice as a way to help them become more reflective in their thinking about potential career possibilities.
- Description of Pre-internship Interview. After students have documented their goals and rationale, it will be important to process these with the instructor-and with the employment officials. Typically this is done in an oral format and is designed primarily to help communicate and clarify expectations prior to the experience. After the interview has been completed and

the objectives discussed and clarified, students should develop a brief, written statement that reflects on the degree to which their goals matched those of the employer. Students should be encouraged to use this tool to reflect on their ability to clarify and communicate their expectations to others.

- Description of Anticipated Internship Activities. Based on the pre-internship interview, students should be prepared to make a preliminary list of activities that they think they will (or would like to) engage in during the internship.
- A Resume
- Written or videotaped records of their job interview.
- Descriptions of typical job duties.
- Photographs of products produced or of the student engaged in an activity.
- Letters of recommendation from the employer, supervisor, or coworkers
- Work evaluation summary conducted by the supervisor (such items as promptness, quality of performance, dependability, cooperation with coworkers and supervisors, ability to learn, and initiative).
- A reflective paper describing the work culture and environment of the internship setting.
- A reflective paper describing the student's own thinking about the adequacy of his/her work attitudes, skills and competencies.
- Other items that the instructor or student would like to include in the album.

As with any authentic assessment tool, it is important to develop these criteria for assessing the album:

- Creativity
- Professional Appearance
- Degree of Reflectiveness
- Organization of the material
- Completeness
- Appropriate and correct rhetorical presentation

Since employees must learn to evaluate their own work, it will be useful to ask students to evaluate the quality of their own albums. Again, it is important that this be done using a set of assessment criteria. One way of doing this is to ask individual students to develop

their own criteria. Another way (and one that reinforces the value of cooperative learning) is to have groups of students collaborate in developing the criteria that will be applied. This collaboration can then be extended to having students apply these criteria to assessing one another's albums.

Affective Assessment Instrument

One of the persistent themes which has emerged from national reports on educational reform is the need for focus on employability skills (SCANS America's Choice: High Skills or Low Wages, Commission on the Skills of the American Workforce, etc.). One recent study noted that "the primary concern of more than 80% of employers was finding workers with a good work ethic and appropriate social behavior: 'reliable,' 'a good attitude,' 'pleasant appearance,' 'a good personality'" (Commission on the Skills of the American Workforce, 1990, p. 3).

Given the importance of these competencies, it is important that tools be developed for assessing the affective domain. The following is a sample instrument which was designed for this purpose.

Segment of an Employer's Affective-assessment Instrument

Directions: Rate the student on each of the following items by circling the appropriate numbers. If the item does not apply, circle "a." If you do not have sufficient information to respond to a particular item, circle "b." Add comments to the last page which may help in understanding and counseling the student. This form is to be completed weekly and returned to the appropriate person each week.

	1	2	3	4	5	a	b
I would rate this student:	Very Independent	Independent except when faced with change	Dependent only on non-routine tasks	Dependent	Very Dependent	Does not apply	Insufficient information
When faced with change, this student:	Displays adequate flexibility	Exhibits flexibility under most conditions	Exhibits tendency to resist change	Displays consistent resistance to change	Displays excessive rigidity	Does not apply	Insufficient information
With regard to maturity, I would rate this student's behaviorism:	Always stable	Generally stable	Occasionally unstable	Frequently unstable	Generally unstable	Does not apply	Insufficient information
In work situations involving a group, this student:	Seeks to be involved	Participates willingly	Participates when encouraged	Avoids participation	Refuses to participate	Does not apply	Insufficient information
In response to supervision, this student:	Accepts direction	Passively accepts authority	Accepts but resents authority	Resents and rejects some direction	Rejects authority	Does not apply	Insufficient information
I would rate this student's reception of communications:	Excellent	Very good	Average	Fair	Poor	Does not apply	Insufficient information

From Erickson, R. C. & Wentling, T. L. (1988). Measuring Student Growth (Used with permission)

Name: _____

Affective Self and Peer Assessment

For each of the criteria, assign a rating to each member of the class or technology group (including yourself) on a scale of 4 - 0. (4 = excellent, 3 = good, 2 = average, 1 = poor, 0 = unsatisfactory.)

	Student A	Student B	Student C
Initiative: (ability as a self-starter, self motivated)			
Use of time: (consistently on task, productive, efficient)			
Reliability: (regular attendance, carry tasks through to completion)			
Work quality: (tasks and operations were well done)			
Idea quality: (good problem-solving skills and ideas)			
Ability to work with others: (ability to share tasks, contributing team member)			
Overall knowledge of space:			
TOTALS:			

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Performance Assessment - An Internet Scavenger Hunt

The internet system offers access to an amazing variety of resources, information, graphics, and contacts. This assessment is designed to see how many kinds of "things" you are capable of locating. Good luck and happy hunting. *Warning! Don't start this exercise until you have lots of time to spare. Once you get started, it's hard to stop!*

Item to be found	Located	Where found-Path-Internet Address
Virtual reality information	❑	
Information about future space shuttle missions	❑	
Current weather report for North Africa	❑	
A graphic of a 1955 Corvette	❑	
Review of a current movie	❑	
A clean joke	❑	
Information on old cars	❑	
National Science Foundation information	❑	
A Windows program	❑	
News about Power PC native software	❑	
A shareware CAD program	❑	
Information about smart house technology	❑	
An article from a Russian newspaper	❑	
A good cookie recipe	❑	
Information on robots	❑	
Lyrics for Arlo Guthrie's "Alice Restaurant"	❑	
Total Number Located	❑	

Remember: it is very important to document the route you used to access the information because you will likely need to access it again sometime. Also, technical documentation is one of the important keys skills in all academic areas.

Smart House Focus Questions

1. Define and discuss the term "Smart House." What kinds of devices are typically used?

2. What kinds of functions are typically controlled by smart house technology?

3. Based on current practice and the current direction of technology, identify and discuss five new devices or applications which might be realistically expected to be included in the "smart house" technology of the future.

4. Identify and discuss the barriers which are keeping existing smart house technology from being built into "existing" and "new" construction. What could be done to overcome each of these barriers?

5. Identify and match the cultural values which have created the need for smart house technology. One example is the value placed on convenience by people in our culture.

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Smart House Portfolio

Create a Smart House Portfolio which could include the following items plus more as you wish to add:

- CAD printouts with a smart house layer included
- A bill of materials/equipment list for a smart house (or a smart room)
- A brainstormed list of possible functions to control in a smart house using existing technology (that available on the market today)
- A reflective report on how smart house technology development mirrors society's values and problems (convenience, security, etc.)
- Plans of procedure documenting the construction, assembly, or installation of devices
- A list of smart house equipment and supply vendors
- PC board designs
- Ergonomic information (lighting, temperature, etc.)
- Other

Impacts and Values Portfolio

Make a Technology Impacts and Values Portfolio which could include the following items:

- Reflective response paper based on viewing of the "Electric Horseman" video.
- An energy audit of the school or your home (see TAM 13 - Energy & Power Guide for more information).
- Technical report detailing scenario outcomes as projected in the Sim Earth challenges.
- A report on global warming and the greenhouse effect.
- Activity worksheets from this TAM.
- Technical writeup of landfill/composting test (activity 3).
- Photographs of "ugly scenes" in your town.
- Listing of environmental noise hazards in your community.
- Other

Group Processes/Product Checklist

Yes	No		
☐	☐	1.	Students worked effectively as a group
☐	☐	2.	Math averaging done correctly
☐	☐	3.	Measuring done properly
☐	☐	4.	Followed the designs on the patent
☐	☐	5.	Contributed positively to discussion and analysis of results
☐	☐	6.	Followed the rules/parameters given
☐	☐	7.	Produced a quality sketch for patent
☐	☐	8.	Creative use of jigs, fixtures, and/or templates
☐	☐	9.	Produced a quality technical report

7-9 criteria met = Excellent
4-6 criteria met = Acceptable
0-3 criteria met = Improvement needed

Multilevel Check List

This scale can be expanded for a rubric containing multiple checkoffs as is used with the following sample:

Trait	*Considerable*	*Adequate*	*Little*	*None*
Evidence of safety consciousness	☐	☐	☐	☐
Evidence of problem solving	☐	☐	☐	☐
Evidence of concern for product quality	☐	☐	☐	☐
Evidence that student is connecting learning from other subjects and topics	☐	☐	☐	☐
Evidence that student is a self starter	☐	☐	☐	☐
Evidence that student can work as a member of a team	☐	☐	☐	☐

Rubrics

A critical point must be made at this juncture. When many teachers think of grading and assessment, they tend to think of "end of instruction" activity. Furthermore, the image is typically of semi-secret devices (gradebooks, test booklets, etc.) containing information that is primarily intended for the teacher's eyes. Rubrics, however, are most effective if they are used in a much more open and process-oriented manner. Of course, the same point could be appropriately made of many other assessment tools that have been used by technology educators. Openness and process-orientation are certainly not unique to rubrics.

This said, rubrics (and other assessment tools) should be openly shared with students at the outset of instruction to clearly communicate expectations to students and then be used to monitor activity throughout. Several of the teachers have found it useful to include students in the process of developing and customizing rubrics. When approached in this manner, they found that assessment not only became more authentic, their students also experienced it as less threatening and less confrontational. Their students were empowered and became more invested in their own assessment, because they had participated in its development and maintenance. Also, these teachers indicated that when they allowed their students to participate in their own assessment that their students' learning became more focused and self-directed. The boundaries between teaching, learning, and assessment were much less clear and, more significantly, the distinctions were less important. One final benefit of this more open approach to assessment that was noted by these teachers has to do with documentation. Students need to learn how to document and reflect on the direction and quality of their work. As responsibility for rubric development and scoring was shifted to their students, these teachers found that their students became more reflective about their learning and that much of the anticipated increase in their own paperwork load failed to materialize.

Against this background, it should be noted that rubrics typically contain two important features. Namely, they:

- identify and clarify specific performance expectations and criteria, and
- specify the various levels of student performance.

At the simplest level, checkoff lists are rubrics. More complex rubrics describe different levels of student performance for selected performance objectives. These will be described and illustrated more fully on the following pages.

Rubrics are tools which are particularly useful in assessing criteria which are often complex and subjective. Many of the goals and expectations in technology education are quite broad and global in nature. This breadth is often a function of the inherent nature of technology education content. Consider, for example, a broadly stated goal that specifies that students should be able to apply principles of design to the planning and construction of a usable product. While this is certainly something we want technology education students to be able to do, it can be very difficult (and subjective) to assess. Rubrics can clarify and objectify these criteria.

Rubrics exist in a variety of forms and vary considerably in degree of complexity and level of outcome. All rubrics include the following features. They:

- are focused on measuring a stated or identified performance, objective, behavior, or quality (essentially a target),
- include some form of scale used to rate student characteristics or performance,
- contain specific and identifiable performance characteristics arranged in levels indicating the degree to which a standard has been met.

The following (Figure 2) is a sample of Holistic rubric which includes these characteristics and which is designed to assess the affective component of a wide variety of activities.

Performance Criteria	3	2	1
Courtesy	Treated each member with complete courtesy and respect at all times	Treated each member with complete courtesy and respect most of the time	Courtesy and respect of others was lacking
Rules followed	Responded well to all rules	Responded well to rules most of the time with few lapses	Seldom stayed within the rules on his/her own
Performance of Task	Worked diligently to do his/her part of the task	Needed some prompting to stay on or complete task	Caused confusion due to lack of staying on task
Cooperation with Team Members	Cooperated with the team at all times to make completion of task smooth	Cooperated with the team most of the time but needed reminding	Rarely cooperated with team without constant reminding

Developed by: Jeanne Kirchoff, Lincoln County R-3 Schools, Troy, Missouri

Figure 2. Sample Holistic Rubric.

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This sample scoring rubric could be easily adapted and used for outlining expectations and scoring numerous cooperative learning activities. It illustrates the advantages of:

- being flexible and adaptable to fit a broad range of performance criteria or objectives,
- including information-rich data about student performance and attitudes,
- providing additional specific information to students which can make formative and summative evaluation more effective.

Sample Technology Education Rubric

An example of a rubric which was developed for assessing a Bridge Building unit in a structural engineering technology education course uses a similar approach, only with the focus shifted to the assessment of a hands-on technology education activity is illustrated in Figure 3.

Note that the focus of the rubric is rather comprehensive, including traditional test results, construction activity, mathematical calculations, and attitudinal dimensions. This rubric could be easily adapted to include additional criteria. Note also that the rubric refers to other rubrics designed to assess more specific aspects of the unit. This enables a kind of cascading effect (rubrics within rubrics) which allows for additional richness and clarity in the assessment process. It should also be clear that rubrics establish a communications link between the student and teacher which clarifies in advance the substance and levels of performance.

One uniqueness of the rubric illustrated in Figure 3 is that it specifies student expectations for an "A" or "B" as well as indicating unacceptable levels of performance. Its developer, Mike Maxwell, states that the use of rubrics has clarified expectations and has removed failure as an option. "In my system, I simply do not take "N" for an answer. When they find out that I won't accept 'Not Yet' they get used to performing at higher levels in the first place. It has to do with establishing, communicating and then maintaining high expectations."

Bridge Building - Structural Engineering

The goals of the Bridge Building module are to:

- NAME AND DESCRIBE DIFFERENT TYPES OF BRIDGES
- NAME AND DESCRIBE THE TYPES OF TRUSSES WHICH ARE TYPICALLY USED IIN CONSTRUCTION,
- DESCRIBE AND DISCUSS THE PROPERTIES OF PHYSICS WHICH ARE USED IN TRUSS CONSTRUCTION,
- DEMONSTRATE CONCERN FOR QUALITY IN TRUSS CONSTRUCTION ACCORDING TO THE "TRUSS QUALITY RUBRIC."

WHAT TO DO FOR AN A:

1. Pass the truss knowledge module posttest at 90% or above.
2. Construct and test a bridge which meets building specifications specified in the truss quality rubric.
3. Turn in all worksheets, sketches, and full-size drawing for evaluation (on time and with excellent quality - see worksheet and drawing assessment rubrics).
4. Accurately calculate the bridge's efficiency using the following formula:

$$\text{Bridge Efficiency} = \frac{\text{Maximum Weight Supported in Grams}}{\text{Weight of Bridge in Grams}}$$

WHAT TO DO FOR A B:

1. Pass the module posttest at 80% to 89%.
2. Construct and test a bridge which meets most building specifications.
3. Turn in all worksheets, sketches, and full-size drawings for evaluation (on time and with excellent qualit - see worksheet and drawing assessment rubics).

A STUDENT WILL BE MARKED N IF HE/SHE:

1. Does not pass the modules posttest at 80% or above.
2. Does not finish and /or test a bridge.
3. Bridge does not meet building specifications.
4. Does not turn in worksheets, sketches, and full-size drawings for evaluation.

Students who receive a "N" will be expected to continue work on the unit until they have achieved either an "A" or a "B".

Adapted from a rubric developed by mike maxwell, technology education teacher at E. Buchanan, Gower, Missouri

Figure 3. Sample Technology Education Rubric.

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Rubrics for Higher Order Thinking Skills

Rubrics can also focus specific technology education goals within the context of important higher order skills. Important current initiatives which are collectively focused on educational reform (Goals 2000, U.S. Dept. of Education, 1994; SCANS, Secretary's Commission on Achieving Necessary Skills, 1991; Workforce 2000, Hudson Institute, 1989; School to Work, Paris, 1994; etc.) have focused the important question: "What do students need to know and be able to do to live and function successfully in the 21st century?." Those skills which are most typically identified are creative thinker, critical thinker, contributing citizen, self-directed learner, problem-solver, effective communicator, and quality producer.

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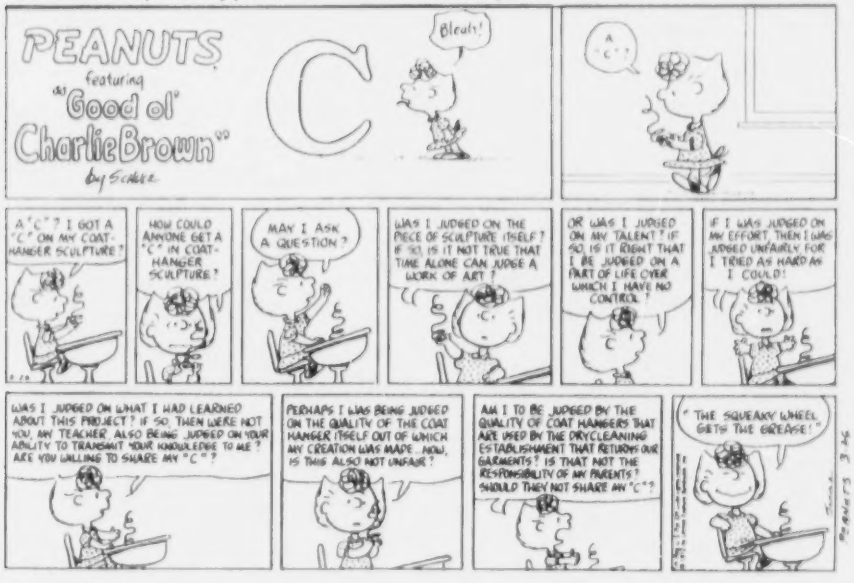
PEANUTS
featuring
"Good ol' CharlieBrown"
by Schulz
C
Bleah!
A "C"?
I GOT A "C" ON MY COAT-HANGER SCULPTURE?
HOW COULD ANYONE GET A "C" IN COAT-HANGER SCULPTURE?
MAY I ASK A QUESTION?
WAS I JUDGED ON THE PIECE OF SCULPTURE ITSELF? IF SO, IS IT NOT TRUE THAT TIME ALONE CAN JUDGE A WORK OF ART?
OR WAS I JUDGED ON MY TALENT? IF SO, IS IT RIGHT THAT I BE JUDGED ON A PART OF LIFE OVER WHICH I HAVE NO CONTROL?
IF I WAS JUDGED ON MY EFFORT, THEN I WAS JUDGED UNFAIRLY FOR I TRIED AS HARD AS I COULD!
WAS I JUDGED ON WHAT I HAD LEARNED ABOUT THIS PROJECT? IF SO, THEN WERE NOT YOU, MY TEACHER, ALSO BEING JUDGED ON YOUR ABILITY TO TRANSMIT YOUR KNOWLEDGE TO ME? ARE YOU WILLING TO SHARE MY "C"?
PERHAPS I WAS BEING JUDGED ON THE QUALITY OF THE COAT HANGER ITSELF OUT OF WHICH MY CREATION WAS MADE. HOW, IS THIS ALSO NOT UNFAIR?
AM I TO BE JUDGED BY THE QUALITY OF COAT HANGERS THAT ARE USED BY THE DRYCLEANING ESTABLISHMENT THAT RETURNS OUR GARMENTS? IS THAT NOT THE RESPONSIBILITY OF MY PARENTS? SHOULD THEY NOT SHARE MY "C"?
"THE SQUEAKY WHEEL GETS THE GREASE!"

A sample Essential Skills Rubric along with suggestions for how technology education teachers can customize it for their use is provided in figure 4. The example presents the Essential Higher Order Skill "Rubric Shell." This "shell" contains the qualities listed above (e.g., creative thinker, contributing citizen, etc.) as well as space to include specific "evidence of performance" information at three levels (Exemplary, Acceptable, and Not Yet Acceptable). In addition to the higher order skill outcomes (listed above), one additional strand is included to customize the rubric specifically for technology education. This category is termed "Technical Knowledge". The Essential Skills are presented in the horizontal rows and are termed "strands." The goals/objectives and performance levels form the columns of the "shell."

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Essential Higher Order Skill "Shell"

Outcome	Weight	Exemplary 2 points	Acceptable 1 point	Not Yet Acceptable 0 points	Sub Total
I. CREATIVE THINKER Fill in with selected Unit Goal or Activity Objective(s). Continue the process for all strands in this column	x?	Select and fill in performance indicators as appropriate for all strands and all columns.			
II. CRITICAL THINKER	x?				
III. CONTRIBUTING CITIZEN	x?				
IV. SELF-DIRECTED LEARNER	x?				
V. PROBLEM-SOLVER	x?				
VI. EFFECTIVE COMMUNICATOR	x?				
VII. QUALITY PRODUCER	x?				
VIII. TECHNICAL KNOWLEDGE	x?				
				TOTAL ? POINTS	

Figure 4. Sample Essential Skills Rubric "Shell"

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This "shell" provides a means of maintaining a consistent grounding of course, unit, or activity objectives in the fundamental skills all students should be able to demonstrate. It should also be noted that the "shell" is very adaptable and can easily be used to assess performance in virtually all academic disciplines.

The discussion will now turn to a set of directions for how to develop and use this rubric "shell." The initial step in filling in the "shell" is to select and validate the goals or objectives for a unit or activity. Once again, the importance of this step cannot be overstated because objectives maintain a focus on the purpose of the activity rather than allowing the activity to become an end in itself. The following sample Essential Skills Rubric (illustrated in Figure 5) was developed to illustrate the completion of the "shell" to assess a specific activity; in this case, developing trigger mechanisms for a specialized photography activity.

Note that the activity's goals and specific criteria are embedded within the larger context of essential higher order skills for all students. It should also be apparent that the "shell" is designed to encourage technology education teachers to distribute their goals across a range of concerns and skills (technical knowledge, attitudinal qualities, etc.) rather than honing in on just one dimension (for example, technical skills). Yet another strength of the "shell" is that it communicates something of the broader educational context to students. For example, the rubric illustrated in Figure 5 broadens the assessment considerably beyond constructing triggers for a specialized photography exercise. The goals extend the assessment foundation to include careers, the design process, technical writing, product quality, and more.

Step One. The initial step in completing and customizing the rubric "shell" involves selecting and "plugging in" the goals or objectives. In Figure 5, the unit goals are for a unit in specialized photography unit and are represented in the first column in italics. It is important to note that the illustration depicts goals designed for a comprehensive unit in graphic communications and are, therefore, stated in rather broad terms. An alternative, and equally valid approach, would be to develop specific objectives for a single activity. These would be much more specific. Either approach is appropriate. The primary concern is that the "shell" be constructed such that it best meets the needs, style, and curricular approach of individual teachers.

Step 2. The second step in completing the rubric "shell" is to identify and specify "behaviors" which serve as indicators across the three performance levels: Exemplary, Acceptable, and Not Yet Acceptable (see the underlined information in the Figure 5 example). The behaviors should be specific enough to communicate expectations and to objectify assessment and yet connect with the activity goals.

Sample Rubric for Specialized Photography Activity

Outcome	Weight %	Exemplary 2 points	Acceptable 1 point	Not Yet Acceptable 0 points	Sub Total
I. Creative Thinker *Compare and contrast the effectiveness of various communication methods, including graphic (visual) and verbal communication.*	x1	Student develops 3 new applications per each trigger.	Student develops 1 new application per each trigger.	Student doesn't develop any new applications.	2
II. Critical Thinker *Comprehend how graphic communication technologies impact and affect society and the everyday lives of its citizens.*	x1	Develops 3 additional social uses (surveillance cams, crash dummies).	Develops 1 additional social use for triggers.	No additional social uses for triggers are developed.	1
Know the basic graphic communication technology terms, including names of equipment, materials, and processes used in the classroom and laboratory.		Student achieves 90% of a terminology exam.	Student achieves 70% of a terminology exam.	Student achieves less than 70% of a terminology exam.	2
III. Contributing Citizen *Demonstrate care of sensitive/fragile equipment and safety to oneself and others when using any graphic communications laboratory materials and equipment.*	x1	Always careful with equipment. Always demonstrates correct safety practices.	Usually careful with equipment. Usually demonstrates correct safety practices.	Careless with equipment. Does not demonstrate correct safety practices.	2
IV. Self-Directed Learner *Identify the various foundation skills for different career options in graphic communications.*	x1	Identifies 3 photography-related careers.	Identifies 1 photography-related careers.	No photographic related careers are identified.	1
V. Problem Solver *Identify, compare, and contrast problems associated with more traditional graphic communication technologies (i.e., traditional drafting) and their newer technologies (i.e., CAD).*	x1	Modifies and improves suggested trigger designs.	Suggested triggers are constructed and workable.	Suggested triggers are unworkable/unconstructed.	4
VI. Effective Communicator *Discuss how the use of computer technology has changed graphic communications processes in the areas of photography, screen printing, CAD, desktop publishing, electronic image manipulation, animation, multimedia, and other graphic technology processes.*	x2	Names and describes 3 new computer-related graphic technologies.	Names and describes 1 new computer-related graphic technology.	Does not know any new computer-related graphic technologies.	2
List and describe the various applications of graphic communication technology, including everyday, specialized, and future uses.		Prepares error-free technical report of photographic technology.	Prepares well-written technical report (additional rubric/ criterion sheet required).	Prepares error-free technical report of photographic technology.	1
VII. Quality Producer *Perform basic operations with graphic communication technologies in areas such as photography, screen printing, CAD, desktop publishing, electronic image manipulation, animation, multimedia, and other graphic technology processes.*	x1	Triggers work consistently (90% of time) and show quality workmanship. Excellent photographic quality.	Triggers work 70% of the time. Appearance of triggers and photos are acceptable.	Triggers work less than 70% of the time. Appearance of triggers and photos are poor.	2
VIII. Technical Knowledge *Identify and discuss the various factors of camera setting including F stops, film speed, etc.*	x1	Consistently & accurately sets F stop & speed to match object distance.	Usually sets F stop & speed to match object distance.	Only occasionally sets F stop & speed to match object distance.	2
				TOTAL POINTS	19

Figure 5. Sample Completed Essential Skills Rubric.

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Step 3. The third step involves assigning weightings to the individual categories (enclosed in boxes in the Figure 5 example). For example, the sample indicates that problem solving was determined to be of twice the value of the other categories.

Step 4. The final step involves assessing student performance on each of the goals or objective strands. For purposes of illustration, a hypothetical student has been assessed by circling the description which best described his/her performance. The column values (2, 1, or 0) are then multiplied by the strand weightings and transferred into the Scoring Column. The total score of the rubric is calculated by simply adding the values in the Scoring Column.

Advantages of Using Rubrics

This approach to rubric development has the advantages of:

- retaining the important general standards (or goals) which are essential for all students in all subjects and activities,
- articulating activity (or course) specific performance standards with the larger general standards (or goals),
- providing a means for assessing specific activity performances within the larger context of goals and standards.

Rubrics are potentially one of the most useful tools in the technology education teacher's toolbox. They may be quite simple (as illustrated in Figure 1) or more complex and multidimensional (illustrated in Figure 5). Among the important advantages of using rubrics in assessment are that they:

- enable assessment to be more objective and consistent;
- focus the attention of the evaluator on the important outcomes with an assignment of value for each of the outcomes;
- demystify the expectations for the students for a project and thus reduce (and hopefully eliminate) the "guesswork factor;"
- allow the student to focus on weak areas and to revisit them while also emphasizing the strengths;
- force the teacher to clarify his/her criteria in specific terms;
- encourage students to develop a consciousness about the criteria they use to assess their own abilities and performance;
- promote students' consciousness about the criteria they use to assess the performance of their peers;
- promote an emphasis on formative as well as summative evaluation;

- provide benchmarks against which to measure and document progress.

Limitations of Rubrics

As with any approach, rubrics have some limitations (as do other forms of authentic assessment). Among these are:

- ***Time***. As with any change in curriculum, it takes time to develop quality rubrics that work. Additionally, rubrics and many other authentic assessment procedures take time to score, particularly if this involves an open, give and take discussion with students. However, as noted earlier, teachers have found that students have quite appropriately assumed some of the responsibility for scoring and maintaining their own rubrics, which decreases the paperwork load on teachers while involving students more fully in documenting their own performance.

- ***Reduction*** of authenticity to observable criteria. While rubrics provide a mechanism for clarifying the goals and objectives of "projects" and "neat activities" (for both students and teachers), there can be a tendency to reduce "information rich" activity to a selected set of easily observable behaviors. It may be quite possible for students to meet these criteria and yet miss the more substantiative and subjective dimensions of their performance. Some of the most important learning may be the most difficult to document and incorporate into the rubric structure. The challenge of writing good rubrics is one of figuring out how important dimensions such as problem-solving, critical thinking, learning transfer, positive attitudes, etc., can be observed and documented. In spite of this potential limitation, criterion grounded rubrics provide a major advantage over subjective "impressions" of student performance.

- ***Inauthencity***. Another challenge faced by teachers who use rubrics and other authentic assessment tools has to do with developing tools that retain and capture the authentic nature of the learning experience. As was just noted above, every attempt should be made to identify criteria that are, at the same time, both authentic and observable. This is not always easy to do.

- ***Multiple tools.*** Most educators know that many different types of tools are necessary for accomplishing most tasks. The same is also true of authentic assessment. Rubrics are but one of many tools that should be developed and used to assess student learning. Our "assessment toolboxes" should contain numerous techniques including those that are perceived to be more traditional.

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Below are several additional examples of rubics that could be used or adapted for a variety of academic subjects:

Generic Rubric for an Outcome Unit

OUTCOME	EXEMPLARY	ACCEPTABLE	NOT YET ACCEPTABLE
CREATIVE THINKER	•fluency is demonstrated by considering many idea or options during the unit	•several ideas or options were explored	•only one option considered
CONTRIBUTING CITIZEN	• works as a positive group member • helps others succeed • shows leadership	• respects property • participates as a group member	• disrespect for other people or property • doesn't participate
SELF-DIRECTED LEARNER	•finds meaningful activities to do when finished with class work	•works without pressure from teacher	•works only under pressure from teacher
CRITICAL THINKER	•analyzes, synthesizes, makes inferences, and makes connections to other knowledge	•analyzes, synthesizes, makes connections using one source	•copies information without analyzing, synthesizing, making connections
PROBLEM-SOLVER	• identifies problems • generates a variety of solutions • develops criteria for evaluating solutions	• generated a few solutions • uses teacher's criteria for evaluating solutions	•no evidence that a problem-solving process is used
EFFECTIVE COMMUNICATOR	• clear, well-stated message • appropriate technology used correctly	• message is understood • few errors in presentation	•message is unclear
QUALITY PRODUCER	• product or performance exceptional • product or performance reflects a "personal best"	• product or performance complete • product reflects good effort and use of ability	• product or performance incomplete • effort is minimal and the quality poor

Adapted from a rubric developed by Cheryl Odneal of the Columbia Public Schools (Columbia, MO)

Product and Personal Quality Assessment
Activity 5 - Line Powered Airplanes

4 = Excellent (student successfully completes activity & displays mastery of subject/content/skill)

3 = Good (student completes activity with good quality/knowledge of skill)

2 = Needs Improvement (student completes activity without demonstrating mastery of subject matter or activity performance requirements)

1 = Not Acceptable (student does not yet successfully complete the activity, needs additional work)

Product Quality

1. Quality of individual component fabrication (accuracy of dimensions, smoothness).	4	3	2	1
2. Join and fit (quality of individual components fit up.)	4	3	2	1
3. Glue joint cleanup and finish.	4	3	2	1
4. Quality of moving part function lack of binding, excessive looseness, etc.	4	3	2	1
5. Waste minimized throughout project.	4	3	2	1
6. Jigs and fixture quality.	4	3	2	1
7. Overall finish and appearance of the plane.	4	3	2	1
8. Detail effects (decals, paint, logo, detail).	4	3	2	1
9. Function ability (flyability).	4	3	2	1

Personal Quality

1. Overall concern for craftmanship.	4	3	2	1
2. Quality of design change/adaptation ideas.	4	3	2	1
3. Team work ability.	4	3	2	1
4. Safety consciousness.	4	3	2	1

Note: This assessment can be used as a peer, self or instructor tool.

Effective Team Evaluation Rubric

A. How clear are the group goals?

1. No apparent goals
2. Goal confusion, uncertainty, or conflict
3. Average goal clarity
4. Goals very clear

B. How much trust and openness was in the group?

1. Distrust, a closed group.
2. Little trust, defensiveness
3. Average trust and openness
4. Considerable trust and openness
5. Remarkable trust and openness

C. How much attention was given to process (the way the group was working)?

1. No attention to process
2. Little attention to process
3. Some concern with group process
4. A fair balance between content and process
5. Very concerned with process

D. What kind of leadership was there in the group?

1. No leadership
2. Leadership concentrated in one person
3. Some leadership sharing
4. Leadership functions distributed
5. Leadership met creatively and flexibly

E. How were group decisions made?

1. No decisions could be reached
2. Made by a few
3. Majority vote
4. Attempts at integrating minority vote
5. Full participation and testing consensus

F. How well were group resources used?

1. One or two contributed, but others silent
2. Several tried to contribute, but were discouraged
3. Average use of group resources
4. Group resources used and encouraged
5 Group resources fully and effectively used

Assessing the Teacher

In 1985, the Missouri state legislature passed legislation requiring Missouri's school districts to conduct teacher assessment on a performance-based basis. In part, the law states that:

The board of education of each school district shall cause a comprehensive performance-based evaluation for each teacher employed by the district. Such evaluation shall be ongoing and of sufficient specificity and frequency to provide for demonstrated standards of competency and academic ability. **abstracted from Guidelines for Performance-Based Evaluation: Teachers, Counselors, & Librarians, January 1991, Missouri Department of Elementary and Secondary Education**

Philosophy and Guiding Procedures for Teacher Evaluation

The performance-based teacher evaluation system as it is implemented and structured in the state of Missouri is based on a number of guiding principles. Among these are that effective teacher evaluation should:

- be viewed as an essential part of the total instructional program;
- be continuous which relates directly to on-the-job performance;
- be a cooperative effort among the board of education, administration and teaching staff;
- reflect measurable, observable and definable teacher behavior;
- facilitate and improve classroom instruction and, thus, to enhance student learning;
- identify teachers' strengths and weaknesses and provide direction for maintaining and improving teacher skills through professional staff development activities;
- provide a basis for fair, objective decision making by local school districts;
- be developed cooperatively by teachers and administrators.
- include both a **formative** evaluation phase and a summative phase.

(Note: For a complete presentation of these guidelines and details of the existing Missouri State Guidelines for teacher evaluation, see Guidelines for Performance-Based Evaluation: Teachers, Counselors, & Librarians, January 1991, Missouri Department of Elementary and Secondary Education).

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Nineteen Suggested Criteria for Teacher Evaluation

Missouri's performance-based teacher evaluation system consists of 19 criteria. These criteria are clustered into the four major areas that comprise the teaching profession in the following manner:

Criteria for Teacher Evaluation

Instructional Process

THE TEACHER:

A. Demonstrates appropriate preparation for classroom instruction.
B. Implements a variety of effective teaching techniques.
C. Provides opportunities for individual differences.
D. Implements instructional objectives effectively.
E. Demonstrates a knowledge of subject matter.
F. Uses a variety of teaching materials effectively.
G. Uses instructional time effectively.
H. Demonstrates ability to motivate students.
I. Demonstrates ability to communicate effectively with students.
J. Provides students with specific evaluative feedback.

Classroom Management

THE TEACHER:

A. Organizes classroom environment to promote learning.
B. Manages student behavior in a constructive manner.

Interpersonal Relationships

THE TEACHER:

A. Demonstrates positive interpersonal relations with students.
B. Demonstrates positive interpersonal relations with parents/patrons.
C. Demonstrates positive interpersonal relations with educational staff.

Professional Responsibilities

THE TEACHER:

A. Participates in professional growth activities.

B. Follows the policies and procedures of the school district.

C. Assumes responsibilities outside of the classroom as they relate to the school.

D. Demonstrates a sense of professional responsibility.

Recommended Enhancements to the Teacher Evaluation Criteria

A set of Descriptors was developed for each of the major evaluation criteria. For the purposes of this manual, it is suggested that the set of Descriptors be expanded to include an increased emphasis on Integrated Academics as an essential criteria for teacher evaluation. To accomplish this, those additions and/or changes that are "integrative" in nature appear in **BOLD FACE** type in the list that follows. Additionally, in those cases where existing descriptors are particularly integrative in nature, the descriptors are **BOLD FACED and ITALICIZED**. Administrators should consider including these changes in their evaluation of teachers.

Teacher Evaluation Criteria with Descriptors

I. Instructional Process

THE TEACHER

A. Demonstrates appropriate preparation for classroom instruction

1. Uses knowledge of students to design educational experiences
2. Selects subject matter which is appropriate to the abilities, needs and interests of the students.
3. Designs lessons in a clear, logical, sequential format.
4. Incorporates into daily planning content from previous levels to insure continuity and sequence.
5. Has materials readily available for the students.
6. **Incorporates subject matter from related academic areas into lesson planning as appropriate.**
7. **Consults with teachers from other academic and vocational areas about how course content articulates and relates to those areas.**

B. Implements a variety of effective teaching techniques.

1. Employs a variety of the following techniques as the subject and learner maturity indicate: lecturing,

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modeling, demonstrating, questioning, experimentation, self-teaching, role playing, **team-teaching, simulations.**

2. **Relates current lessons to previous learning.**
3. Modifies lesson plans and teaching techniques as the learning situation requires.
4. Provides opportunities for students to explore problems and weigh alternatives in decision making.

C. Provides for individual differences.

1. Groups students for each instructional activity in a manner which best assists the learning process.
2. Uses a variety of questioning levels effectively.
3. Provides support materials that are coordinated with the learning experiences and developmental level of the child.
4. Provides a variety of activities which promote maximum student involvement.
5. Provides activities and/or solicits help for remediation and enrichment.
6. Reteaches if testing results indicate it is appropriate.
7. **Develops lessons and experiences that allow students to demonstrate a range of "intelligences."**

D. Implements instructional objectives effectively.

1. Prepares units and presents lessons which reflect the curriculum guide and student needs or readiness.
2. Prepares units and presents lessons in a clear, logical and sequential manner.
3. Communicates learning objectives to students.
4. Uses learning activities designed to achieve stated objectives.
5. Assigns work (oral, written, and constructed) to students which requires application of what they have been taught.
6. Utilizes current events and unexpected situations for their educational value when appropriate to subject.
7. **Uses learning activities that require students to access and transfer information across various academic and vocational areas.**

E. Demonstrates knowledge of subject matter.

1. Displays a competent knowledge of curriculum.
2. Selects and presents subject matter which is accurate.
3. Selects and presents subject matter which is appropriate to the abilities and interests of the student.
4. **Displays an willingness to solicit and access assistance from a variety of sources (other teachers, students community partners, etc.) to connect subject knowledge with meaningful "real world" situations and applications.**

F. Uses a variety of teaching materials effectively.

1. ***Uses multisensory approaches (i.e., tactile, visual, auditory).***
2. Is resourceful in finding, developing and using materials to aid instruction.
3. Uses instructional materials to explain and demonstrate.

G. Uses instructional time effectively.

1. Begins activities promptly.
2. Continues learning activities for the duration of scheduled instructional time.
3. Avoids unnecessary delays during the lesson.
4. Avoids inappropriate digressions from the topic during the lesson.

H. Demonstrates ability to motivate students.

1. Communicates challenging scholastic expectations to students.
2. Strives to motivate students which show little or no interest.
3. Presents activities which simulate current situations outside the school.
4. Responds positively to students' requests for help.
5. Encourages questions and discussions from all students.
6. Stimulates students by choosing proper materials and techniques.
7. Gives feedback to students.
8. Stimulates and encourages creative and critical thinking, **problem-solving, vocational exploration, and situated learning.**
9. **Encourages students to connect their learning to**

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contexts, situations, and experiences that are meaningful and interesting to them.

I. Demonstrates ability to communicate effectively with students.

1. Uses correct oral and written communication.
2. Uses appropriate vocabulary.
3. Presents ideas logically.
4. Gives directions that are clear, concise and reasonable.
5. Uses a variety of verbal and non-verbal techniques.
6. Elicits and responds to student questions.
7. Summarizes effectively.
8. **Demonstrates an ability to understand students' meaningful frame of reference.**

J. Provides students with specific evaluative feedback.

1. Plans pre-assessments to determine learner performance on prerequisites or learner performance on the objective of the unit (i.e., pretest).
2. Prepares and administers both subjective and objective tests on materials that have been taught (i.e., posttest).
3. Constructs tests which reflect what has been taught.
4. Makes appropriate use of test results.
5. Uses various techniques for evaluation and feedback.
6. Returns test results as quickly as possible.
7. Provides written comments in addition to points or scores when appropriate.
8. Makes opportunities for one-to-one conferences.
9. Assesses students as a group and provides individual feedback.
10. **Implements a variety of assessment procedures that are authentic in nature.**
11. **Includes an emphasis on student self-assessment, formative, assessment, and assessing higher-order thinking and learning transfer skills.**
12. **Demonstrates comprehensiveness by assessing students ability to "do" as well as their "attitudes."**

II. Classroom Management

THE TEACHER:

A. Organizes classroom environment to promote learning.

1. Establishes and clearly communicates parameters for student classroom behavior.
2. Anticipates disruptive classroom situations and prepares accordingly.
3. Maintains the classroom in a functional, attractive and orderly environment conducive to student learning.
4. Assesses the learning environment and knows how and when to change that environment.
5. Insures that materials and information can be read, seen and/or heard by the students .
6. Maintains a classroom atmosphere conducive to good health and safety.
7. **Organizes the classroom environment in a manner that fosters flexibility and access to a variety of sources of information.**
8. **Employs a variety of educational technology to facilitate the learning process (multimedia, electronic mail, etc.).**

B. Manages student behavior in a constructive manner.

1. Maintains learner behavior that promotes the possibilities of learning for the group.
2. Promotes self-discipline **and responsibility for self-directed learning.**
3. Reinforces appropriate behavior.
4. Uses techniques (e.g., social approval, contingent activities, punishment, keeps students on task, etc.) to maintain appropriate behavior.
5. Overlooks inconsequential behavior problems.
6. Corrects disruptive behavior constructively.
7. Endeavors to find and eliminate causes of undesirable behavior.
8. Manages discipline problems in accordance with administrative regulations, school board policies and legal requirements.

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III. Interpersonal Relationships

THE TEACHER:

A. Demonstrates positive interpersonal relations with students.

1. Promotes positive self-image in students.
2. Promotes students' self-control.
3. Makes an effort to know each student as an individual.
4. Interacts with students in a mutually respectful and friendly manner.
5. Gives constructive criticism and praise when appropriate.
6. Is reasonably available to all students.
7. Acknowledges the rights of others to hold differing views or values.
8. Demonstrates understanding and acceptance of different racial, ethnic, cultural and religious groups.
9. Uses discretion in handling confidential information and difficult situations.

B. Demonstrates positive interpersonal relations with educational staff.

1. ***Works cooperatively with colleagues in planning and delivering instructional activities.***
2. ***Shares ideas, materials and methods with other teachers.***
3. Makes appropriate use of support staff.
4. Works cooperatively with the school's administration to implement policies/regulations for which the school is responsible.
5. Informs administrators and/or appropriate personnel of school-related matters.

C. Demonstrates positive interpersonal relations with parents/patrons.

1. Cooperates with parents in the best interest of the students.
2. Provides a climate which opens communication between teacher and parent.
3. Supports and participates in parent-teacher activities.
4. Promotes patron involvement with school.
5. Initiates communication with parents when appropriate.
6. **Works collaboratively with community partners (business, industry, governmental agencies, etc.).**

IV. Professional Responsibilities

THE TEACHER:

A. Participates in professional growth activities.

1. Demonstrates commitment by participation in professional activities (e.g., professional organizations, coursework, workshops, conferences).

2. ***Takes advantage of opportunities to learn from colleagues, students, parents and community.***

3. Keeps abreast of developments in subject matter and issues related to teaching.

B. Follows the policies and procedures of the school district.

1. Strives to stay informed regarding policies and regulations applicable to his/her position.

2. Selects appropriate channels for resolving concerns/problems.

C. Assumes responsibilities outside of the classroom as they relate to the school.

1. Assumes necessary noninstructional responsibilities.

2. Exercises responsibility for student management throughout the entire building.

D. Demonstrates a sense of professional responsibility.

1. Completes duties promptly and accurately.

2. Is punctual.

3. Provides accurate data to the school and district as requested for management purposes.

4. Carries out duties in accordance with established job description.

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Assessing the Program

One of the most important dimensions of integrated assessment has to do with program assessment. Program assessment focuses primarily on the big picture rather than on individual components. It is designed to examine the entire system, its goals, features, culture, etc., that form the context for the many kinds of activities that occur within it. In a school setting, it is important to have good teachers, administrators, curriculum, programs, activities, etc. But it is equally critical that all of these components function together toward a common mission. Assessment must never be restricted to an examination of components. It must also include a view of the "big picture"! This is the function of program assessment.

In the worst case, teachers experience program assessment from a distance, as a function of the school's administration. In these cases there is little investment in the process throughout the school system. Teachers know that the school is being evaluated because they have been requested to provide an abundance of information about their classrooms to the administration. Such formal evaluation procedures by external accrediting agencies are of course important and essential to maintaining the quality of educational institutions across the state.

A focus on integrated learning forces some fundamental rethinking of processes involved in program assessment at the local level. As is the case with individual classrooms, there tends to be:

- a sense that program assessment is an ongoing, formative process that occurs independently from formal program reviews by external agencies,
- an increased investment in the process by everyone in the school system (including staff, students, teachers, parents, etc.),
- involvement of everyone in formulating and clarifying the school's goals,
- an ongoing exploration of new possibilities for integrating the various components of the curriculum with other components,
- the promotion of a school culture that values people and their ideas,
- the promotion of a school culture that is open to change, new possibilities, and new ways of doing things,

- an increased awareness of the culture of the institution,
- an emphasis on possibilities and the development of a shared vision,
- an emphasis on trust and openness rather than power, position, and authority,
- openness to and valuation of the ideas of everyone in the school,
- the use of multiple types of evaluative input (interviews, surveys, open forums, etc.),
- communication, communication, communication!

There are three key dimensions that must be considered in any program assessment (King, Morris, & Fitz-Gibbon, 1989). They are:

- The Program's Context
- The Program's Activities
- The Program's Theory of Action

The Program's Context

The context of a program consists of at least two different aspects; tangible and intangible. In most school systems, there will be contextual elements that will resist integration. Among these may be turf, discomfort with change, a lack of information, outdated curriculum, instructional and assessment practices, lack of appropriate resources, etc. These factors are normal and must be understood with sensitivity if program assessment is to occur in a positive and creative manner. As program assessment is increasingly woven into the culture of a school, then it can become a dynamic, creative, and open process rather than something that is viewed with fear and apprehension.

- Tangible Context
  - Physical Plant
  - Equipment
  - Offices
  - Classrooms
  - Community's demographic characteristics
  - Study body size
  - Education and background of teachers Tangible Context

Questions:

Tangible Context

- What physical changes could be made to promote better integration of learning?
- What additional links could be forged with businesses and industry in the community?
- What kinds of physical, scheduling, or inservice changes are there that would increase the quality and quantity of communication among everyone in the school?
- What are the most serious deficiencies in resources available to promote integration (time, money, energy, etc.)?
- What kinds of structural and organizational patterns are there in the school that tend to impede the integration of academics across the system (assessment procedures, administrative structure, physical proximity of offices, curriculum development process, etc.)?
- Others

- Intangible Context
  - Administrative procedures,
  - School climate,
  - Degree and patterns of communication (among teachers; teachers, students, and administration; between school officials and the larger community, etc.),
  - Openness to reform, change, and new ideas,
  - Informal reward structures,
  - Others?

  Intangible Context Questions:

  - What kinds of inservice opportunities are there that would promote better communication and integration across the curriculum?
  - How free do teachers feel to try new ideas?
  - What are the most needed 3-4 changes that would have the most positive impact on improving the climate of the school?
  - What are the most serious factors that are limiting the integration of curriculum, instruction, and assessment within the system?
  - Others?

The Program's Activities

The second dimension that must be examined as a part of an ongoing process of formative program assessment has to do with the school's activities. This dimension is at the core of the program assessment process and should involve:

- a comprehensive listing of the school's activities, and
- an examination of the degree to which each of the activities contributes to meeting the long and short term goals of the system. (The importance of this step cannot be overstated. If significant integration is to occur within the system across the academic and vocational areas, it is imperative that these goals be clearly established and articulated.)

A comprehensive listing of a school system's activities should include:

- Activities designed to communicate with parents
- Partnerships with local businesses and industry
- Curriculum coordination and development
- Program advisory committee structures
- Extracurricular activities
- Links with vocational schools
- Faculty inservice program
- The athletic program
- Others

The Program's Theory of Action

Has to do with what people in the system believe and value.

- Equitable access to learning for all students.
- Beliefs about the importance of integration.
- Beliefs about the appropriate types of assessment procedures.
- The role and value of the school in the community.
- The value of individual programs in the community context (athletics, vocational education, various academic programs, etc.).
- Aspirations and goals of the community for its young people.
- Other.

Characteristics of Healthy School Organizations

Cunningham and Gresso (1993) have identified characteristics deemed essential to reform-oriented schools and educational systems. These provide a sound basis for the development of criteria for program assessment and can be summarized as follows:

- A CONSISTENT FOCUS IS MAINTAINED ON IMPROVEMENTS THAT WILL POSITIVELY IMPACT STUDENTS;

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- COLLEGIALITY, TRUST, INTEGRITY, AND SUFFICIENT TIME FOR OPEN, FREE-FLOWING COMMUNICATION ARE FOSTERED THROUGHOUT THE SYSTEM
- A VISION FOR THE SCHOOL IS DEVELOPED IN AN OPEN AND MUTUALLY SHARED MANNER;
- MUTUAL SUPPORT, GROWTH, AND INNOVATION ARE VALUED, SUPPORTED AND REWARDED;
- IMPROVEMENT IS VIEWED IN THE LONG TERM (3-7 YEARS);
- THERE IS CONSISTENT, FACE-TO-FACE INVOLVEMENT OF APPROPRIATE STAKEHOLDERS (BOTH INTERNAL AND EXTERNAL TO THE SCHOOL SYSTEM);
- TIME IS SPENT FOCUSING ON AND ACCESSING THE INTERESTS AND EXPERTISE THAT IS AVAILABLE WITHIN THE SYSTEM;
- IMPROVEMENT IS VIEWED AS CONTINUOUS, SYSTEMATIC, AND INCREMENT
- STAFF DEVELOPMENT IS CONSIDERED AN ESSENTIAL COMPONENT TO SYSTEMIC GROWTH AND IMPROVEMENT;
- THERE IS CONSIDERABLE AND SUSTAINED COOPERATION AMONG HOME, SCHOOL, AND COMMUNITY;
- FEEDBACK IS CONSTANTLY MONITORED AND ENCOURAGED;
- ADMINISTRATIVE SUPPORT FOR INDIVIDUAL CHANGE EFFORTS IS CONSISTENTLY PRESENT.

Assessment Section Summary

To summarize, this assessment section of the integration handbook has been divided into three main sections. The initial section focused on the process of assessing students. Some perspective and information was presented about authentic and performance-based assessment, as these related particularly well with integrated learning. A number of samples were then presented that are designed to be adapted for use by teachers as they see fit as they attempt to promote the process of integrated learning.

The second component of this assessment section focused on teacher evaluation. The approach in this section was to expand the current performance-based teacher education standards for teacher assessment to include some additional standards that are particularly integrative in nature.

The final section takes the widest view. In this section, the focus shifted to the assessment of entire programs and school districts. Materials were presented that are designed to facilitate the process of assessing the degree to which integration is occurring on a large scale basis.

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